the required incentive to modify or withdraw the rejection.

In the Office Action, the Examiner concedes that "Ito as modified does not disclose a menu option associated with a plurality of submenu." (Office Action, p. 5). The Examiner cites Atkinson for the proposition that "it is well known in the art that a menu option is associated with a plurality of submenus" (Office Action, p. 5-6). The Examiner however has not offered a reference providing a *suggestion to combine* Ito or any system having selection regions *outside the display* with Atkinson. For the reasons discussed below in connection with claim 33, such a combination is nonobvious. "When the incentive to combine the teachings of the references is not readily apparent, it is the duty of the examiner to explain why combination of the reference teachings in proper.... Absent such reasons or incentives, the teachings of the references are not combinable." *Ex parte* Skinner, 2 U.S.P.Q. 2d 1788, 1790 (B.P.A.I. 1987). It appears that the Examiner is relying upon her personal knowledge for an incentive to combine these references. Applicant requests the Examiner provide a prior art reference or affidavit under 37 C.F.R. §107(b) evidencing the required incentive to combine or withdraw the rejection.

The Examiner concedes that "Ito as modified does not disclose an indicator for indicating the time difference between the cursor at a second location and the cursor at a first location." (Office Action, p.6). The Examiner however has not offered a motivation or reference providing a *suggestion to combine* Ito with Choi. For the reasons discussed below in connection with claim 134, such a combination is nonobvious. It appears that the Examiner is relying upon her personal knowledge for an incentive to combine these references. Applicant requests the Examiner provide a prior art reference or affidavit under 37 C.F.R. §107(b) evidencing the required incentive to combine or withdraw the rejection.

II. REMARKS

Claim 24 is amended to add a trailing period.

Claim 32 is amended to delete extra verbiage added inadvertently.

Claim 39 is amended to add a plurality of indicators. Also the modifier "first" is added to the selection event in this claim to distinguish this selection event from those in dependent claims.

Claims 40, 46, 47 and 48 are amended to maintain consistency with the new modifier of selection event in their parent claim.

Claim 53 is amended to remove a reference to "the surface" which lacks an antecedent.

Claim 65 is amended to clarify the location and arrangement of the selectable regions.

Claims 67 and 69 are amended to replace the plurality of switches with a single switch having a plurality of positions, the switch being positionable with respect to the location of each menu option for selection thereof.

Claim 119 is amended to clarify the location of the external boundary.

Claim 136 is amended to make clear that the specified indicating function is in addition to the indicating function described in the parent claim.

Claim 148 is amended to clarify the relationship between the specific menu option and the particular submenu option.

Each of claims 149 and 163 is amended to correct a typographical error.

Each of claims 159-162 is amended to specify that switch has a plurality of positions.

Claim 161 is additionally amended to make clear that menu and submenu options are each associated respectively with a switch position.

Claims 204-205 are new.

No new matter is added.

The paragraph numbers of the remarks below correspond to the paragraph numbers in the Office Action.

4-5. Applicant files herewith a terminal disclaimer pursuant to 37 C.F.R. §1.321(c).

6. In these Remarks, references are referred to as follows:

Reference	Cited herein as
U.S. Patent No. 5,177,328 to Ito et. al.	Ito
U.S. Patent No. 4,586,035 to Baker et. al.	Baker
U.S. Patent No. 5,285,265 to Choi	Choi
U.S. Patent No. 4,931,783 to Atkinson	Atkinson
U.S. Patent No. 4,291,198 to Anderson et. al.	Anderson
Golding, V.G; Heneghan, M. J.; "Audio Response Terminal," *IBM Technical Disclosure Bulletin*, vol. 26, no. 10B, March 1984.	Golding
Lazzaro, Joseph J., "Computers for the Disabled," *Byte*, June, 1993.	Lazzaro

Collectively the above references are referred to in these Remarks as the applied references or applied art.

Claims 1, 19-58, 61-80, 82-89, 94, 101-106, 108, and 112-203 are pending in the present application. Of these, claims 1, 19, 33, 39, 52-54, 61, 63, 65, 67, 70-74, 76, 78-80, 85, 89, 94, 106, 114, 134, 147, 155, 159, 160-166, 170, and 198 are independent.

The Examiner has rejected all pending claims in the present application. "Claims 1, 19-58, 61-80, 82-89, 94, 101-106, 108, 112-203 are rejected under 35 U.S.C.103(a) as being unpatentable over Ito et al (US. PAT. NO. 5,177,328) in view of Baker (US.PAT. NO. 4,586,035), Lazzaro ("Computers for the Disabled"), Golding ("Audio Response Terminal"), Atkinson (US. PAT. NO.4,931,783), Choi (US. PAT. NO. 5,285,265), Anderson (US. PAT. No. 4,291,198)." (Office Action, p.3-4). In the Office Action the Examiner pointed out the specific grounds, i.e. which of the applied references, form the basis for the rejection of which claims.

Invention may reside in discovering the source of a problem, as well as its solution. In re *Kaslow*, 707 F.2d 1366, 1373, 217 U.S.P.Q. 1089, 1094 (C.A.F.C. 1983). This is part of "the subject matter as a whole" and should always be considered when determining the obviousness of an invention under 35 U.S.C. §103. In re *Sponnable*, 405 F.2d 578, 585, 160 U.S.P.Q. 237, 243 (C.C.P.A. 1969).

Applicant invented a user interface useful for individuals with neuromuscular disorders ("NMD operators"), in particular, cerebral palsy. Applicant observed NMD operators attempting computer access . Many NMD operators, especially those with more severe impairments, cannot effectively use the conventional point and click or point and dwell (on-screen keyboard) computer interface (Specification, page 6, lines 5-9) because they cannot point precisely. Applicant isolated several constituent motor problems that contribute to imprecise pointing, for example, overshoot, tremor, drift, and involuntary movement accompanying voluntary movement (Specification, page 2, line 27 - page 3, line 6, and page 6, lines 16-18). Moreover, Applicant observed that the directional control exhibited by these individuals is often relatively good. The Applicant's discovery of the *source* of the problem of imprecise pointing is nonobvious. Consequently, applicant's claimed method and apparatus for solving this problem satisfies the nonobvious requirement of 35 U.S.C. §103.

The invention provides functionality absent in the prior art, i.e. a new result. The invention enables NMD operators to control, among other devices, a voice output system and thereby verbally interact with their parents, teachers, fellow students, co-workers, and medical personnel. The invention may be used by literate users through an orthographic interface, or by illiterate users through a symbolic interface using, for example, pictographs such as those shown in Figure 11 of the Application.

The following discussion is organized by claims. First each claim is described, focusing on how the structural elements cooperate to produce the end result. Next, the structural, operation,

theoretical and functional differences between each claim and each of the applied references and the combination of the applied references is described. Then differences between the claim as a whole and the combination of the applied references are pointed out. The discussion below addresses the pending claims in the order of a depth first traversal of the claim tree.

Independent claim 1 is directed to an apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a display screen; (b) means for at least partially delimiting a plurality of selectable regions, each of the selectable regions outside the display screen and each associated respectively with a displayed menu option; (c) movement related signal receiving means for receiving a movement related signal indicating successive locations with respect to the display screen; and (d) selection means, responsive to a first dwell event associated with a particular one of the selectable regions outside the display screen, the particular selectable region intersected by a plurality of the successive locations for selecting the menu option associated with the particular selectable region.

Independent claim 1 stands rejected on the basis of Ito alone. "Fig. 5 of Ito discloses the display system comprising a display screen (3), means for at least partially delimiting a plurality of selectable regions (25A-25C), and each of the selectable regions outside the display screen and each associated respectively with a displayed menu option, which [sic] within the scope of independent claims 1, 106, 114, 147, 155, 165, 166, 94, 158, 170, 39, 61, 89, 78." (Office Action, p.7, line 18 - p.8, line 2).

First and foremost, the apparatus of claim 1 differs from the Ito in that the selection means of claim 1 is responsive to a dwell event. The Examiner acknowledged that "Ito does not disclose the selection means is responsive to a dwell event." (Office Action, p.5). Therefore Ito alone does not lie within the scope of claim 1, which was the basis for the rejection.

Lazzaro discloses a system responsive to a dwell event, and was relied upon for the rejection of claim 19, among others. Lazzaro will be in connection with those claims.

In addition to the difference concerning selection responsive to dwell, the apparatus of claim 1 differs structurally, functionally, and theoretically from the disclosure of Ito. The structural difference concerns the nature of the display/input device. The structure Ito uses and teaches is an *integrated* display/input device or tablet, as can be seen by the frequent references to this structure. (Ito, col. 2, lines 4, 8, 13, 21, 34, 39; col. 3, lines 39, 41, 45, 58; col 4, lines 16, 24, 37, 39, 56, 61; col. 5, lines 7, 14; and Ito, FIG. 4, 5, 8.). Ito does not disclose or suggest the use of an input device *separate from* the display device.

This difference is the subject of new claim 204, depending from claim 1.

An important functional difference in results follows from having a target of relatively large width, .e.g. FIG. 17 of the present application, versus the narrow selection region disclosed in Ito, e.g. Ito, FIG. 3, 5, and 12. Within limits, as the width to a selectable region increases, the time required to position a pointer on that selectable region decreases, in accord with Fitts' Law. Fitts, P.M., "The information capacity of the human motor system in controlling the amplitude of movement, *Journal of Experimental Psychology*, 1954, vol. 47, pp. 381-391. Fitts hypothesized that a given human movement has a characteristic index of difficulty, called ID, where

$$ID = \log_2 (2A / W)$$

where

A = average amplitude of a human movement

W = target width

Within limits, movement time is a function of ID, according to the equation:

$$MT = a + bID$$

where

MT = movement time

a = constant

b = constant

ID = index of difficulty

Investigators, with minor exceptions, have reported findings that provide general confirmation of Fitts' theory. (see citations reported in Fitts, P.M. and Peterson, J.R., "Information capacity of discrete motor responses", *Journal of Experimental Psychology*, vol. 67, pp. 103-112, 1964, at page 104, col. 1, line 41 - col. 2, line 2).

Target width, W, appears in the denominator of the equation for ID. Therefore, the mean movement time MT of an apparatus having wide selectable regions differs from the mean movement time of an apparatus having relatively narrow selectable regions. Ito's integrated display/input device and the present invention each have a different and characteristic index of difficulty ID. All other factors being equal, the index of difficulty of the present invention is substantially smaller than Ito's because the present invention uses a substantially wider selectable region, W.

Ito uses the area outside his selection region for two different purposes. The first is labels. "The upper surface of the casing of transparent tablet 2 bears labels indicating the commands

assigned to the regions 25A, 25B and 25C." (Ito, col. 4, lines 36-38). Ito does not disclose or suggest using this area to expand his selectable region. Ito's second use of the area outside his selection region is for selection of a cancel command. (Ito, FIG. 6; col. 4, lines 51-59; col. 6, lines 3-8). Widening Ito's selection region thus has the effect of *increasing* the mean movement time required for the cancel command, in accord with Fitts' Law. Consequently Ito teaches against wide selectable regions.

A minimum width, expressed in terms of the range of motion of user, is the subject of new claim 205, depending from claim 1.

The apparatus of claim 1 provides a critical new result, a result not attained by the methods and apparatuses disclosed in any of the applied references or by the proposed combination of the applied references. Because of their inability to grasp a pen stylus, many NMD operators cannot use an integrated input/display device disclosed by Ito. Because of their imprecise pointing skills, many NMD operators, would not be able to select Ito's small selection regions. Many NMD operators, particularly those with cerebral palsy, cannot reliably or efficiently use on-screen keyboards such as disclosed by Lazzaro (Specification, page 6, lines 5-9). On-screen keyboards are generally used by individuals with high level spinal chord injury. These users, unlike those with cerebral palsy, have normal motor control of their heads and consequently can control the cursor with a head pointer, pointing and dwelling accurately.

The apparatus of claim 1 solves the problem of imprecise pointing, at least in part, by providing for large selectable regions outside the display.

In the Office Action, the Examiner cites Baker, but does not rely on it in rejecting claim 1. However, the Examiner does state that Baker discloses certain elements found in claim 1. Therefore, Baker's disclosure is addressed here.

The first problem with modifying Ito with elements from Baker is that the references are directed a different problems, flowing from their different operating environments. Ito's system uses a pen stylus. Selection regions outside the display area are selectable. Baker's system uses a mouse and a conventional mouse adapter (Baker, col. 5, line 65 - col. 6, line 4). Unlike Ito, in Baker there are no external areas outside the display, as will be discussed below. A person of ordinary skill in the art would not combine elements from such differing operating environments.

The Examiner appears to have misread Baker, and so erred in finding that Baker disclosed an invisible selectable region outside the display area. The Examiner then relied on this element to bridge Ito to Baker. Without this element, there is no bridge.

The second reason Ito and Baker not combinable concerns their different use of selectable regions. Locating external areas *on* the display is fully consonant with the purpose of Baker; locating external areas outside the display area is not. The object of Baker's invention is to increase the screen real estate available for information display by making menu items, e.g. page up, page down, virtual. "The present invention maximizes the screen area available to the operator for document and data display in the windows both during the functional operations of the display as well as during selection of menu items." (Baker, col. 2, lines 29-32). Baker accomplished his object by *time multiplexing* screen real estate, i.e. using the same space at different times for two different functions: (1) displaying information in a window, and (2) displaying a menu item. Time multiplexing space means that Baker's virtual menu items and information must reside in the same space to serve Baker's purpose. If Baker's external areas were located *outside* the display, they could not be used for information display.

Third and finally, there is no suggestion in either reference to combine it with the other.

The Examiner relies on Baker to teach that "the selectable region include an invisible subregion *outside* the display area." (Office Action, p.4, emphasis added) Baker simply does not teach this. Baker discloses external areas *on* the display, as shown in Figure 3 of Baker. Although Figures 8 and 9 of Baker do not show the full display area, Baker clearly indicates that the windows shown in Figures 8 and 9 are *smaller* than the display area. "FIG. 8 is a diagrammatic representation of a window ... such as that shown in FIG. 3" (Baker, col. 3, lines 53-55). FIG. 9 depicts "window 42 of FIG. 8 and the area surrounding the periphery 41 of this window" (Baker, col. 7, lines 5-7). Consequently, Baker's external areas are *on*, not outside, the display because the exterior box shown in FIG. 8 is smaller than the display.

Baker's virtual menu items are not normally visible. If they were located outside the display, they would never be visible. The user would have no indication when he had invoked a menu item. Thus, this modification of Baker is non-functional.

The Examiner also states that Baker teaches "*selecting* a selectable region by moving the cursor within the selectable region," and that "Baker teaches it [moving the cursor within the selectable region] is a conventional way to *activate* a selectable region." (Office Action, p.4,5, emphasis added) This is incorrect. Baker's method of selection has multiple steps:

1. wait for mouse input and convert this input into a first location on the screen (Baker, col. 9, lines 29-32);
2. determine if there is an intersection of the location and one of the areas 1-12 (Baker, col. 9,

lines 36-38);

3. if there is an intersection, hide the cursor and display the appropriate virtual menu item; (Baker, col. 9, lines 52-55);
4. wait for mouse input and convert this input into a next location on the screen (Baker, col. 9, lines 60-64);
5. determine if there is an intersection of the next location and area 0, i.e. the normal window (Baker, col. 9, lines 64-69);
6. if the mouse button has been pressed, implement the function represented by the displayed menu item (Baker, col. 10, lines 1-5).

Baker discloses *displaying*, not selecting, a virtual menu item responsive to the cursor crossing a peripheral region of the window (Baker, col. 3, lines 1-3). As implemented in Baker's preferred embodiment, the *display* of a virtual menu item is responsive to the intersection of two cursor locations and an external area. "[A] safeguard is built into the system to insure that the operator truly intended to cross into Area=5 and thus *bring up* the MOVE SCREEN menu item. Accordingly, step 86, next mouse input is waited for and converted to the new location." (Baker, col. 9, lines 57-62, emphasis added). Baker discloses *selection* responsive only to a press of the mouse button (Baker, col. 6, line 44, col. 10, lines 1-13, 44, and 65). "[T]he procedure awaits the operator to press the appropriate mouse button so that the function represented by the MOVE SCREEN menu item may now be implemented ..." (Baker, col 10, lines 2-5).

In claim 1, selection is responsive to a dwell event. Baker does not disclose or suggest selection responsive to a dwell event. A dwell event, as defined in the Specification, includes a *period* of intersection.

The combination of claim 1 is believed patentable.

In claim 108, depending from claim 1, at least one of the selectable regions is completely delimited. Claim 108 is believed patentable.

Independent claim 19 is directed to an apparatus for use with a human interface system including a display. A first cursor may be displayed on the display and moved responsive to successive locations indicated by a movement related signal. The apparatus is for selecting a menu option associated with an overshot selectable region on the display. The apparatus comprises: (a) means for displaying a plurality of selectable regions within a first polygon intersecting the display, each selectable region associated respectively with a menu option. Each selectable region is adjacent

a side of the first polygon and the plurality of selectable regions together at least partially circumscribing a region on the display; (b) movement related signal receiving means for receiving the movement related signal indicating the successive locations; and (c) control means for (1) moving the first cursor within the first polygon responsive to the successive locations indicated by the movement related signal; (2) confining at least part of the first cursor to the first polygon; and (3) in response to a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of the first cursor and one of the selectable regions, selecting the menu option associated with the intersected selectable region.

Independent claim 19 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

In the Office Action, the Examiner concluded that claim 19 was obvious in view of a proposed a combination of a modification of Ito with selected elements of Lazzaro. Ito and Lazzaro and not combinable for three reasons. First, Ito teaches selection regions outside the display screen. This is critical to achieving Ito's intended result. Lazzaro teaches displaying all key images on the display. Displaying key images is critical to Lazzaro. Otherwise the user must memorize a complex menu hierarchy. These references are thus in conflict and not combinable.

Second, the Examiner combines Ito with Lazzaro to provide selection means responsive to a dwell event. However, the proposed combination of Ito and Lazzaro is improper because, in the combination, Ito is no longer operable for its intended purpose. Selection according to Lazzaro is by dwell, i.e. intersection with a virtual key from an *on-screen* keyboard for a user-defined timer period (Lazzaro, p. 62, second column, lines 7-11.) Selecting a region by dwell *requires* coordinate detection. Consequently, in Lazzaro, there is no selection *outside* the on-screen keyboard. Ito's stylus pen offers the advantage of being active *outside the location detection range* of the tablet. Ito takes advantage of this. Ito uses stylus switch closure outside the location detection range of the tablet to signal a cancel command (Ito, FIG. 6; col. 4, lines 51-59; col. 6, lines 3-8), in accord with one of the objects of Ito's invention, increasing the quantity of data on a single screen (Ito, col. 2, lines 6-9 and 38-49). Ito achieves this goal in part through selection *without* coordinate detection. Combining dwell selection with Ito renders Ito inoperable for this function. "Where a reference would have been inoperable for its intended purpose if modified to show the claimed invention, then it does not establish prima facie obviousness because it effectively teaches away from the claimed invention." In re *Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (C.A.F.C. 1984).

Third and finally, Ito explicitly teaches against combination with selection methods other than switch closure. "[I]tem selection and command input can be carried out by using that part of the coordinate detection range of the tablet, which extends beyond the display range of the display device of the integrated display/input device, and *only* on the basis of switching data." (Ito, col. 8, lines 11-12, emphasis added). Switching data is defined as having "OFF" and "ON" states (Ito, col. 5, lines 13-18).

Assuming *arguendo* that Ito and Lazzaro may be combined, the combination lacks the functionality of the apparatus of claim 19, specifically, confining the first cursor to the first polygon. In independent claim 19, selection is responsive to an intersection of the first cursor and a selectable region. The claimed structure, in concert with confining the first cursor to the first polygon, allows the user to overshoot the intended selectable region with the movement related signal, and *still select it*. This new result flows from the synergy between the polygon, the confining function of the control means, and the location of the selectable regions. Many users with impaired ability to stop motion, common in cerebral palsy, tend to overshoot their targets. The apparatus of claim 19 accomodates overshoot, and thus allows these users to make selections. This is a result not achieved by Ito, Lazzaro, or any of the applied art

The combination put forth in the Office Action does not contain a confining polygon, either on the display or elsewhere. If the Examiner believes that a confining polygon is inherent in the applied art or in the proposed modifications to that art, the Examiner must so state so Applicant can respond to the assertion.

Lazzaro's on-screen keyboard (figure on Lazzaro, p.62) occupies a significant portion of the display, space which cannot be used by a concurrently running application program, and, by occupying a contiguous area, restricts the shape of the application program window. As can be seen from Lazzaro's figure, each key image is very small. At the size shown, these keys are very difficult for many NMD operators to select. (Specification, p. 6, line 5-14). However, increasing the size of the key images *decreases* the space available for the application program window.

The apparatus of claim 19 achieves an important object of the present invention: to simultaneously display an application program window and a computer access menu which does *not* obstruct the application program window. (Specification, p. 11, lines 15-16). This result is achieved in part by delimiting selectable regions outside the display area.

Independent claim 19 is believed patentable.

Claim 20, depending from claim 19, specifies that the first polygon is located *on* the display.

Since all the selectable regions are within the first polygon, all selectable regions are *on* the display. In the Office Action, the Examiner concludes that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify each of the selectable region in Fig. 2 of Ito to be adjacent a side of the polygon *on* the display, and the plurality of selectable regions together at least partially circumscribing a region of the display since the number of selectable regions and the location of the selectable regions are the desirable choice based on the desired commands to be allocated to the selection regions (note col. 7, lines 32-40 of Ito)." (Office Action, p.4, emphasis added). This conclusion ignores Ito's teaching. Ito not only does not disclose selectable regions at least partially circumscribing a region ("a perimeter menu") *on* the display, Ito explicitly teaches against it. Ito in FIG. 2 discloses a conventional integrated display/input device having menu items thereon. The central idea of Ito teaching is to move those menu items *outside* the display. One of the objects of Ito's invention is to "provide an integrated display/input device wherein the *quantity of data* to be input/displayed on a single screen is *increased*." (Ito col. 2, lines 6-9, emphasis added.) Ito states that one of his goals is to *reduce* the number of icons displayed by the display device, allowing the screen of the display device to be used effectively. (Ito col. 2, lines 31-33). Ito's purpose is that "the *entire* display area can be used to display given contents." (Ito, col. 7, lines 12-13, emphasis added). Moving menus *onto* the display is contrary to Ito's express purpose. Thus Ito teaches away from this modification. In re *Gordon*, *Ibid.*

The section of Ito referred to above by the Examiner states: "The number of selection regions 25 is not limited to three. Desired commands can be allocated to the selection regions by rewriting the command names (codes) set in the command indication area 123 of the RAM 12. For example, function keys [F1] to [F10] used in a conventional computer keyboard may be arranged, as shown in FIG. 12, and desired command and processing functions may be allocated to the function keys, as shown in FIG. 13." (Ito, col. 7, lines 32-40). This contains no suggestion or justification for moving Ito's selection regions onto the display. Indeed Ito's FIG. 12 clearly shows Ito's selection regions *outside* the display screen.

Ito is the primary reference relied on by the Examiner in the rejection. Given Ito's inapplicability, as described above, Ito's application to each pending claim must be questioned.

Claim 20 is deemed patentable independent of its parent claim.

In claim 21, depending from claim 20, at least one of the selectable regions intersects the at least partially circumscribed region. This structure is not disclosed or suggested in any of the applied references. Claim 21 is considered patentable independent of its parent claim.

In claim 22, depending from claim 20, the control means is further operative to confine at least part of the first cursor to a second polygon on the display. This function is not disclosed or suggested in any of the applied references. The confiner, in concert with the perimeter menu, supports a function not present in any of the applied art: the user may overshoot the intended selectable region and still select it because the confiner confines the indicated location to the display area. Claim 22 is considered patentable independent of its parent claim.

In claim 23, depending from claim 22, the control means is further operative to switch, responsive to an intersection of the first cursor and one of the selectable regions, from confining at least part of the first cursor to the first polygon to confining at least part of the first cursor to the second polygon. This function is not disclosed or suggested in any of the applied references. Claim 23 is considered patentable independent of its parent claim.

In claim 24, depending from claim 22, the control means is further operative to switch, responsive to a distance between two of the successive locations, from confining at least part of the first cursor to the first polygon to confining at least part of the first cursor to the second polygon. This function is not disclosed or suggested in any of the applied references. Claim 24 is considered patentable independent of its parent claim.

In claim 25, depending from claim 22, the control means is further operative to switch, responsive to an angle indicated by three of the successive locations, from confining at least part of the first cursor to the first polygon to confining at least part of the first cursor to the second polygon. This function is not disclosed or suggested in any of the applied references. Claim 25 is considered patentable independent of its parent claim.

In claim 26, depending from claim 22, the first polygon intersects the second polygon. This structure is not disclosed or suggested in any of the applied references. Claim 26 is considered patentable independent of its parent claim.

In claim 27, depending from claim 26, the first polygon includes all of the area of the second polygon. This structure is not disclosed or suggested in any of the applied references. Claim 27 is considered patentable independent of its parent claim.

The apparatus of claim 82, depending from claim 22, further comprises sensor signal receiving means for receiving a sensor signal indicative of an actual or attempted muscle activation. The control means is further operative to switch, responsive to the sensor signal, from confining at least part of the first cursor to the first polygon to confining at least part of the first cursor to the second polygon. None of the applied art discloses or suggests the function of switching between confining

polygons. Claim 82 is considered patentable independent of its parent claim.

In claim 83, depending from claim 82, the human interface system includes a switch and the sensor signal indicates an operation of the switch. Claim 83 is believed patentable.

In claim 84, depending from claim 22, all of the area of the second polygon lies within the first polygon. None of the applied art discloses or suggests this structural relationship between the first and second polygons. Claim 84 is considered patentable independent of its parent claim.

In claim 28, depending from claim 20, the selection of the control means is further responsive to the proximity of one of the successive locations indicated by the movement related signal to the location of the first cursor. When the location indicated by the movement related signal overshoots the first polygon, there is a distance between the location and the first cursor which is confined to the first polygon. The selection of the control means is responsive to this distance. None of the applied references disclose or suggest responsiveness to this distance. Claim 28 is considered patentable independent of its parent claim.

In claim 29, depending from claim 20, the selection of the control means is further responsive to the proximity of one of the successive locations indicated by the movement related signal to the intersected selectable region. None of the applied references disclose or suggest responsiveness to this distance. Claim 29 is considered patentable independent of its parent claim.

In claim 30, depending from claim 20, the first polygon has at least five sides. None of the applied references disclose or suggest this structure. Claim 30 is considered patentable independent of its parent claim.

In claim 31, depending from claim 20, at least one of the plurality of selectable regions is associated with an icon on the display. Ito teaches the use of labels outside the display, e.g. Ito, FIG. 5, 12. As described above, Ito teaches against using the display screen for anything other than information display. Claim 31 is believed patentable.

In claim 32, depending from claim 31, the icon represents one of a sign of a manual sign language, a location relative to a human body, a topic of conversation, a sentence, a desired direction of movement of a second cursor on the display, a sequence of one or more graphics including an ideograph, and a symbol of a symbol set. No such icons are disclosed or suggested by the applied references. Claim 32 is deemed patentable.

Independent claim 33 is directed to selection of a submenu option from a menu hierarchy. The apparatus comprises: (a) a display area; (b) a menu comprising a plurality of menu options, at least one of the menu options associated with a submenu comprising a plurality of submenu options; (c)

means for at least partially delimiting: (1) a plurality of first selectable regions, each of the first selectable regions associated respectively with one of the menu options and each of the first selectable regions including a first subregion adjacent the display area and a first subregion on the display area, the plurality of the first subregions on the display area together at least partially circumscribing a first region on the display area; and (2) a plurality of second selectable regions, each of the second selectable regions associated respectively with one of the submenu options and each of the second selectable regions including a second subregion adjacent the display area and a second subregion on the display area, the plurality of the second subregions on the display area together at least partially circumscribing a second region on the display area; (d) movement related signal receiving means for receiving a movement related signal indicating successive locations with respect to the display area; and (e) selection means for selecting, in response to a first dwell event, the menu option associated with the first selectable region intersected by one of the successive locations indicated by the movement related signal, the menu option being one of the menu options associated with a submenu, and for selecting, in response to a second dwell event, the submenu option associated with the second selectable region intersected by one of the successive locations indicated by the movement related signal.

The Examiner states that it is well known in the art that a menu option may be associated with a plurality of submenus, and therefore is not novel. (Office Action, p. 8). Whether a menu hierarchy is novel or not is irrelevant under 35 U.S.C. §103 which requires analysis of obviousness of a claim as a whole, not novelty of an element thereof.

Independent claim 33 stands rejected under 35 U.S.C. §103 based upon a proposed combination of Ito, Lazzaro, and Atkinson.

The Examiner has cited Atkinson for the association of a menu option with a plurality of submenus. There are several problems with extracting this particular element from Atkinson. The first is that the Atkinson reference is not pertinent prior art under 35 U.S.C. §103. A person of ordinary skill in the art of the present invention would not consult Atkinson because Atkinson is not concerned with a problem shared with the present invention. Atkinson is directed to a problem associated with pull-down menus. "[S]ince the pull-down window generates a menu window which is typically in a fixed position, any images near that fixed position are frequently obscured" (Atkinson, col. 2, lines 2-5). In claim 33 selectable regions associated with both menu options and submenu options circumscribe a region on the display area. An example of such a structure is depicted in Figures 17 and 18 of the present application. Images in the circumscribed region are not

obscured, the problem Atkinson addresses. The apparatus of claim 33 simply does not have this problem.

In the Office Action, the Examiner concluded that claim 33 was obvious in view of a proposed a combination of a modification of Ito with selected elements of Lazzaro and Atkinson. However, Ito teaches static commands located outside the display, as shown in Ito FIG. 5. "The upper surface of the casing of transparent tablet 2 bears labels indicating the commands assigned to the regions 25A, 25B and 25C." (Ito, col. 4, lines 36-38). Static commands are integral to the invention, since once of the objects of the invention is to "provide an integrated display/input device wherein the *quantity of data* to be input/displayed on a single screen is *increased*." (Ito col. 2, lines 6-9, emphasis added.) One of Ito's goals, explicitly stated, is to reduce the number of icons displayed by the display device, allowing the screen of the display device to be used effectively. (Ito col. 2, lines 31-33). Ito's purpose is that "the entire display area can be used to display given contents." (Ito, col. 7, lines 12-13). Moving menus *onto* the display is contrary to Ito's express purpose. Thus Ito teaches away from this modification, and therefore cannot be combined with Atkinson. In re *Gordon*, *Ibid.*

The Examiner is apparently using the present Specification as a guide through the prior art for reconstructing the claimed invention. This is evident from the Examiners particular modifications of selected elements of the applied references. For example, Atkinson is exclusively directed to *linear* menus. (Atkinson, Figures 1b, 2, 3a, and 3b, col. 1, lines 42-52, col. 2, lines 29-34, col. 2, lines 67 - col. 3, line 2, col. 3, lines 66-68, col. 4, line 63, col. 5, lines 60-65, col. 6, line 28). Nothing in Atkinson discloses or suggests the at least partially circumscribing selectable regions as claimed. Therefore, assuming *arguendo* that Atkinson can properly be combined with the proposed combination of Ito and selected elements of Lazzaro, the most natural combination would be a menu window containing a *linear menu* of command items on the display. This combination lacks the functionality of the present invention according to claim 33. Individuals with impaired motor control have great difficulty selecting from linear menus, and thus would not be able to use such a menu window.

An alternative combination of Ito and Atkinson, eschewed by the Examiner, is to move Atkinson's menu outside the display, as taught by Ito. The impracticality of this combination is immediately apparent and illustrates the inappropriateness of combining these references. The user must memorize a complex menu hierarchy. Suppose he remembers the location of the Edit command option. Once he selects Edit, he must remember where the Undo, or Cut, or Copy command item resides in the next level of the menu hierarchy. Ito disclosed only one level for his

command menu is thus apparent: a menu outside the display places a memorization burden on the user. Ito recognized this drawback and proposed that the commands in the menu should be "used commonly in a plurality of application programs." (Ito col. 8, lines 16-17). The present invention according to claim 33 overcomes this drawback in Ito by doing what Ito teaches against: placing selectable regions *on* the display area.

Independent claim 33 is considered patentable.

In claim 34, depending from claim 33, one of the menu options represents a group of characters and a first one of the submenu options represents a first one character of the group of characters. Thus, the user can select a characters from the menu hierarchy. None of the applied references disclose or suggest such a menu hierarchy. Claim 34 is considered patentable independent of its parent claim.

In claim 35, depending from claim 34, each character of the group of characters has one of: (a) an extension at least a predetermined distance above the baseline of the group of characters; (b) an extension below the baseline of the group of characters; (c) lack of the characteristic described in (a); and (d) lack of the characteristic described in (b). None of the applied references disclose or suggest any such commonality among options in a menu. Claim 35 is considered patentable independent of its parent claim.

In claim 36, depending from claim 34, the distance on the display area between the first subregion on the display area associated with the menu option representing the group of characters and the second subregion on the display area associated with the submenu option representing the first one character of the group of characters is responsive to the frequency of use of the first one character. None of the applied references disclose or suggest distributing perimeter submenu options responsive to frequency of use. Claim 36 is considered patentable independent of its parent claim.

In claim 37, depending from claim 34, (a) a second one of the submenu options represents a second one character of the group of characters; (b) the first one character is more frequently used than the second one character; and (c) the distance on the display area between the first subregion on the display area associated with the menu option representing the group of characters and the second subregion associated with the submenu option representing the first one character of the group of characters is less than the distance on the display area between the first subregion on the display area associated with the menu option representing the group of characters and the second subregion on the display area associated with the submenu option representing the second one character of the group of characters. None of the applied references disclose or suggest distributing characters in a perimeter

menu hierarchy so that a more frequently selected character is associated with a subregion that is closer to its parent subregion than a less frequently selected character. Claim 37 is considered patentable independent of its parent claim.

In claim 38, depending from claim 34, the position of a character of the group of characters indicates the position of the second subregion on the display area associated with the submenu option representing the first one character of the group of characters. None of the applied references disclose or suggest such a structural relationship in a menu hierarchy. Claim 38 is believed patentable independent of its parent claim.

Independent claim 39, as amended, is directed to an apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a display area; (b) means for at least partially delimiting a plurality of selectable regions, each of the selectable regions outside the display area and each associated respectively with a menu option; (c) movement related signal receiving means for receiving a movement related signal indicating a location with respect to the display area; (d) a plurality of indicators, each associated respectively with one of the selectable regions, for indicating which one of the selectable regions is intersected by the location; and (e) selection means for selecting, in response to a first selection event associated with the selectable region intersected by the location, the menu option associated with the intersected selectable region.

Independent claim 39 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito does not disclose or suggest one or more indicators for indicating which one of the selectable regions is intersected by the location.

Independent claim 39 is believed patentable.

In claim 40, depending from claim 39, the selection event is defined to include a switch operation at or near the time the intersection occurs. Claim 40 is believed patentable.

Claim 41, depending from claim 39, adds to the apparatus of claim 39 means for indicating the menu option associated with each selectable region. Claim 41 is believed patentable.

Claim 43, depending from claim 39, adds to the apparatus of claim 39 location indication means for indicating the location of each selectable region. Claim 43 is believed patentable.

In claim 44, depending from claim 43, the location indication means further comprises means for displaying each menu option on the display area. The location of each displayed menu option indicates the location of the associated selectable region. As was discussed previously, Ito teaches against displaying commands on the display. Claim 44 is considered patentable independent of its

parent claim.

In claim 45, depending from claim 43, the location indication means includes means for displaying at least part of each selectable region on the display area. As was discussed previously, Ito teaches against using the display for selection regions. Claim 45 is considered patentable independent of its parent claim.

In claim 46, depending from claim 39, the first selection event includes a switch operation. The selection means further comprises switch operation receiving means for receiving a signal indicating the switch operation. Claim 46 is believed patentable.

In claim 47, depending from claim 39, the selection means is at least partially disabled in response to a second selection event. None of the applied art disclose or suggest disabling the selection means in whole or in part. Claim 47 is deemed patentable independent of its parent claim.

In claim 48, depending from claim 47, the selection means, in response to a third selection event, is restored to the functionality it had prior to the second selection event. Claim 48 is believed patentable.

In claim 49, depending from claim 39, all or all but one of the selectable regions are partially delimited. None of the applied references disclose or suggest selectable regions outside the display area which are partially delimited. Claim 49 is considered patentable independent of its parent claim.

In claim 50, depending from claim 49, one of the selectable regions is completely delimited. Claim 50 is believed patentable.

In claim 51, depending from claim 49, the apparatus further comprises a computer system including display means for displaying at least part of the output of an application program executable on the computer system in the region on the display area. At least one of the menu options represents an input to the application program. Claim 51 is believed patentable.

Independent claim 52-54 stand rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

Independent claim 52 is directed to an apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a surface; (b) means for delimiting a plurality of selectable regions on the surface, each of the selectable regions associated respectively with a menu option, the plurality of selectable regions together at least partially circumscribing a region on the surface; (c) a pointer, responsive to the movement of a one of an operator's limbs, digits and head, for indicating successive locations on the surface; and (d) selection means for selecting, in response to a dwell event, the menu option associated with the selectable region intersected by one of the

successive locations indicated by the pointer.

The Examiner relies upon Lazzaro as a reference for selection means responsive to a dwell event. The reasons for rejecting the combination of Ito and Lazzaro have already been discussed in connection with claim 19.

Independent claim 52 is considered patentable.

Independent claim 53, as amended, is directed to an apparatus for selecting a menu option from a plurality of menu option. The apparatus comprises: (a) means for displaying a plurality of selectable regions on a display area, each of the selectable regions associated respectively with a menu option, the plurality of selectable regions together at least partially circumscribing a region on the display area; (b) movement related signal receiving means for receiving a movement related signal indicating successive locations with respect to the display area; and (c) in response a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the durations of a plurality of successive periods of intersection of two or more of the successive locations and one of the selectable regions, selection means for selecting the menu option associated with the intersected selectable region.

The apparatus of claim 53 adds two important features not previously discussed. First, the plurality of the at least partially circumscribing selectable regions is *on* the display area. This structure is not disclosed or suggested by Ito. Second, the selection means is responsive to a *plurality* of successive periods of intersection. None of the applied art, including Lazzaro, discloses or suggests selection responsive to a *plurality* of successive periods of intersection. Claim 53 is considered patentable.

Independent claim 54 is directed to an apparatus for selecting an option from a menu. The apparatus comprises: (a) cursor movement means for receiving a movement related signal and for moving a cursor on a display responsive to the received movement signal; (b) delimit means for delimiting on the display a first plurality of regions and a second plurality of selectable regions, each of the second plurality of selectable regions associated respectively with a menu option; the first plurality of regions together at least partially circumscribing a first region on the display; and (c) selection means, responsive only to an intersection of the cursor and a first one of the first plurality of regions and thereafter to a first selection event associated with one of the second plurality of selectable regions, for selecting the menu option associated with the selectable region associated with the first selection event.

In claim 54, as in claim 53, both the first and second perimeter menus are *on* the display. As

described in connection with claim 53, this structure is not disclosed in the applied art, including Ito. The selection means is responsive first to *only* an intersection of the cursor and a first one of the first plurality of regions and thereafter to a first selection event. None of the applied art discloses or suggests selection responsive only to an intersection. l

Independent claim 54 is deemed patentable.

Claim 55, depending from claim 54, adds means for receiving a switch operation signal. The delimit means includes means for displaying the first plurality of regions responsive to the received switch operation signal. None of the applied art discloses or suggests *displaying* regions responsive to a switch operation signal. Claim 55 is believed patentable independent of its parent claim.

In claim 56, depending from claim 54, the second plurality of selectable regions together at least partially circumscribe the first region on the display. The first region on the display is at least partially circumscribed by the first plurality of selectable regions, as specified in claim 54. None of the applied references disclose or suggest dual pluralities of selectable regions on the display at least partially circumscribing the same region. Claim 56 is deemed patentable independent of its parent claim.

In claim 57, depending from claim 54, the apparatus further comprises a third plurality of selectable regions, each of the third plurality of selectable regions associated respectively with a menu option. The selection means is further responsive to an intersection of the cursor and a second one of the first plurality of regions and thereafter to a second selection event associated with one of the third plurality of selectable regions, for selecting the menu option associated with the selectable region associated with the second selection event. Claim 57 is considered patentable.

In claim 58, depending from claim 54, the selection means includes means for receiving a switch operation signal. The first selection event includes: (1) an intersection of the cursor and the selectable region associated with the second selection event; and (2) at or near the time the intersection occurs, receipt of the switch operation signal. Claim 58 is believed patentable.

Independent claim 61 is directed to a menu option selector in a human interface system wherein a body member of an operator may indicate a location on a surface. The menu option selector comprises: (a) the surface including a display area, the display area having thereon a plurality of selectable regions, each of the selectable regions associated respectively with a menu option, the plurality of selectable regions together at least partially circumscribing a region on the display area; (b) a clipper for generating, in response to the location indicated by the body member of the operator indicating a location outside the display area, a clipped location indicative of a location on the display

area; and (c) a selector for selecting, in response to a selection event, the menu option associated with the selectable region intersected by the clipped location.

Independent claim 61 stands rejected on the basis of Ito alone (Office Action, p.7, line 18 - p.8, line 2).

Ito does not disclose or suggest a display area having *thereon* a plurality of selectable regions, as discussed in connection with claim 20. Ito's selection regions lie outside his display screen. In addition, Ito does not disclose or suggest a clipper for generating a clipped location. The claimed combination provides a function not present in Ito, or any of the applied art: the user may overshoot the intended selectable region and still select it because the clipper generates a clipped location on the display area. The clipper generates the clipped location. The selector selects the selectable region intersected by the clipped location.

Independent claim 61 is considered patentable.

In claim 62, depending from claim 61, each of the plurality of selectable regions is adjacent an edge of the display area. Claim 62 is believed patentable.

Independent claim 63 is directed to a menu option selector in a human interface system wherein a body member of an operator may indicate a location on a surface. The menu option selector comprises: (a) the surface including a display area, the display area having thereon a plurality of selectable regions, each of the selectable regions associated respectively with a menu option, the plurality of selectable regions together at least partially circumscribing a region on the display area; (b) a confiner for confining the location indicated by the body member of the operator to the display area; and (c) a selector for selecting, in response to a selection event, the menu option associated with the selectable region intersected by the location indicated by the body member of the operator.

Independent claim 63 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

Ito does not disclose or suggest a display area having *thereon* a plurality of selectable regions, as discussed in connection with claim 20. In addition, neither Ito nor Lazzaro disclose or suggest a confiner for confining the location indicated by the body member of the operator to the display area. The claimed combination provides a function not present in Ito, Lazzaro, or any of the applied art: the user may overshoot the intended selectable region and still select it because the confiner confines the indicated location to the display area.

Independent claim 63 is considered patentable.

In claim 64, depending from claim 63, each of the plurality of selectable regions is adjacent an

edge of the display area. Claim 64 is believed patentable.

Independent claim 65 is directed to a menu option selector in a human interface system wherein a body member of an operator may indicate successive locations on a surface. The menu option selector comprises: (a) a detector area on the surface, the detector area including a plurality of selectable regions, each of the selectable regions associated respectively with a menu option, the plurality of selectable regions together at least partially circumscribing a region on the surface; (b) a confiner for confining the location indicated by the body member of the operator to the detector area; and (c) a selector for selecting, in response to a dwell event associated with any one of the selectable regions, the menu option associated with the selectable region associated with the dwell event.

Independent claim 65 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

As was discussed in connection with claim 63, neither Ito nor Lazzaro disclose or suggest a confiner for confining the location indicated by the body member of the operator to the display area. This structure provides a function not present in Ito, Lazzaro, or any of the applied art: the user may overshoot the intended selectable region and still select it because the confiner confines the indicated location to the display area.

Independent claim 65 is considered patentable.

In claim 66, depending from claim 65, each of the plurality of selectable regions is adjacent an edge of the detector area. Claim 66 is believed patentable.

Independent claim 67, as amended, is directed to an apparatus for selecting an option from a menu. The apparatus comprises: (a) a display area; (b) means for displaying a plurality of menu options, the display of the plurality of menu options together at least partially circumscribing a region on the display area, each menu option associated respectively with a position of a user activatable switch outside the display area, the switch being positionable with respect to the location of each menu option for selection thereof; and (c) a selector for selecting a particular one of the menu options in response to a first position of the switch corresponding to the particular menu option for a period equalling or exceeding a first predetermined time period.

Independent claim 67 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Anderson (Office Action, p.7).

Independent claim 67, as amended, is directed to an alternate embodiment of the invention. In this alternate embodiment the user is able to use a *single*, multi-position switch, and position it with respect to the location of each menu option. This differs structurally from Anderson, which discloses

a *plurality* of key switches. Each key is associated respectively with a *single* label (Anderson, col. 20, lines 52-54, and FIG. 8), and each key permits a station set user "to selection *a* certain portion of the text in a display on the screen" (Anderson, col. 4, lines 46-47, emphasis added).

The apparatus of claim 67 also differs operationally from the combination of Ito and Anderson. Selection in claim 67 requires that the switch correspond to the particular menu option for a period equalling or exceeding a predetermined period. Neither Ito nor Anderson, the references relied on by the Examiner to reject this claim, disclose or suggest selection responsive to a period of switch activation.

Independent claim 67 is deemed patentable.

In claim 68, depending from claim 67, the display means is further operative to indicate the selected menu option. Claim 68 is deemed patentable.

Claim 69, depending from claim 67, is directed to selection from a menu hierarchy. The apparatus adds to its parent claim a plurality of submenu options associated with the particular menu option. Each of the submenu options is associated respectively with a position of the switch. The display means is further operative, responsive to the selection of the particular menu option, to display the plurality of submenu options, the display of the plurality of submenu options together at least partially circumscribing the region on the display area. The selector, in response to a second position of the switch corresponding to a specific one of the submenu options for a period equalling or exceeding a second predetermined time period, is further operative to select the specific submenu option.

Neither Ito nor Anderson discloses or suggests a menu hierarchy. The linear menu of Atkinson has already been discussed in connection with claim 33.

Independent claim 70 is directed to an apparatus for use with a general purpose computer system including a display on which a cursor may be displayed, the general purpose computer system being capable of executing an application program. The apparatus comprises: (a) a medium readable by the general purpose computer system; and (b) a program, stored on the medium and executable by the general purpose computer system, for: (1) displaying a plurality of selectable regions within a polygon on the display, each selectable region adjacent a side of the polygon, one or more of the selectable regions each associated respectively with a sequence of one or more characters, the plurality of selectable regions together at least partially circumscribing a region on the display; (2) receiving a movement related signal and moving at least part of the cursor only within the polygon responsive to the movement related signal; and (3) in response to a first quantity equalling or

exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of the cursor and one of the one or more selectable regions, inputting the sequence of one or more characters associated with the intersected selectable region to the application program.

Independent claim 70 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

The patentable significance of a perimeter menu *on* the display has already been discussed in connection with claim 20. The functional difference and advantage over the applied art of moving the cursor *only* within a polygon on the display, the patentable significance of a selection responsive to dwell, and the non-combinability of the applied art, have already been discussed in connect with claim 19.

Independent claim 70 is believed patentable.

Independent claim 71 is directed to a data entry system including a computer system on which may be executed an application program. The data entry comprises: (a) the computer system including a display; (b) a pointer selected from the group consisting of a (1) mouse; (2) trackball; (3) joystick; (4) stylus and graphics tablet; (5) lightpen; (6) thumb wheel; (7) touch screen; (8) head pointer; and (9) intraoral pointer, the pointer coupled to the computer system; and (c) program means executable on the computer system for: (1) displaying a plurality of selectable regions within a polygon on the display, each selectable region adjacent a side of the polygon, the plurality of selectable regions together at least partially circumscribing a region on the display; (2) moving a cursor within the polygon responsive to movement of the pointer; and (3) in response to a selection event and an intersection of the cursor and a selectable region associated with an input for the application program, inputting the input to the application program.

Independent claim 71 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito, the sole reference relied on by the Examiner in rejecting claim 71, does not disclose or suggest moving a cursor responsive to movement of a pointer. The patentable significance of a perimeter menu *on* the display has already been discussed in connection with claim 20. The functional difference and advantage over the applied art of moving the cursor *only* within a polygon on the display has already been discussed in connect with claim 19.

Independent claim 71 is considered patentable.

Independent claim 72 is directed to a computer access system for an operator having impaired

motor capability. The computer access system includes a computer system on which may be executed a computer program. The computer access system comprises: (a) the computer system including a display; (b) program means executable on the computer system for: (1) displaying a plurality of selectable regions within a polygon on the display, each selectable region adjacent a side of the polygon, the plurality of selectable regions together at least partially circumscribing a region on the display; (2) receiving a movement related signal and moving at least part of a cursor only within the polygon responsive to the movement related signal; and (3) in response to a selection event and an intersection of the cursor and a selectable region associated with an input for the computer program, inputting the input to the computer program.

Independent claim 72 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

Claim 72 differs from the on-screen keyboard disclosed in Lazzaro in that it is intended for an operator having impaired motor capability. As described in connection with claim 1, on-screen keyboards are generally used by individuals with high level spinal chord injury. These users, unlike those with cerebral palsy, have normal motor control of their heads and consequently can control the cursor with a head pointer, pointing and dwelling accurately. The apparatus of claim 72 permits computer access by individuals with cerebral palsy, a result not achieved by any of the applied art.

In addition, claim 72 differs from the applied art in displaying the at least partially circumscribing selectable regions *on* the display. This has already been discussed in connection with claim 20. The functional difference and advantage over the applied art of moving the cursor *only* within a polygon on the display, and the non-combinability of the applied art, have already been discussed in connect with claim 19.

Independent claim 72 is deemed patentable.

Independent claim 73 is directed to a voice output system for a user having impaired speech. The voice output system comprises: (a) a display on which may be displayed a plurality of selectable regions within a polygon on the display, each selectable region adjacent a side of the polygon and one or more of the selectable regions associated respectively with and displaying on the display a sequence of one or more letters, the plurality of selectable regions together at least partially circumscribing a region on the display; (b) a voice output device; and (c) control means for: (1) receiving a movement related signal and moving a cursor within the polygon responsive to the movement related signal; (2) in response to a succession of selection events, each associated respectively with an intersection of the cursor and one of the selectable regions associated with one of

the one or more sequences of one or more letters, appending the sequence associated with the intersected selectable region to at least one previously selected sequence; and (3) speaking, by means of the voice output device, the word spelled by the appended sequences.

Independent claim 73 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Baker, Golding, and Lazzaro (Office Action, p.7, lines 4-5).

The proposed combination of Ito, Baker, Golding, and Lazzaro does not disclose or suggest spelling by appending successive selected sequences of letters, as claimed in claim 73.

Golding does not address a problem in common with Ito, Baker, or Lazzaro, and therefore is not combinable with these references. Golding addresses the drawback in the data entry art "that the operator has to read the input data document and any reference to the screen or printer requires the operator's visual attention to be shifted from the source document. (Golding, p. 5633, lines 8-10) Golding's disclosure expressly limits speech output to *data/text entry.* (Golding, p.5633, line 1) Furthermore, Golding's speech output represent "spoken commands to the operator" (Golding, p. 5634, lines 20-21), *not* menu options. Thus, Golding does not disclose or suggest *menu options* representing sequences of one or more letters, as claimed.

The patentable significance of selectable regions *on* the display has already been discussed in connection with claim 20. The functional difference and advantage over the applied art of moving the cursor within a polygon on the display, and the non-combinability of Ito, Baker, and Lazzaro, have already been discussed in connect with claim 19.

Claim 73 is believed patentable.

Claim 104, depending from claim 73, limits claim 73 by adding the following elements:

1. the movement related signal is responsive to the *head movement* of the user;
2. each of the plurality of selectable regions is adjacent an edge of the display;
3. each of the succession of selection events includes a *plurality* of periods of intersection of the cursor and the intersected selectable region, each of the plurality of periods of intersection having a total duration equalling or exceeding a predetermined period; and
4. the control means further includes means for indicating the difference between the predetermined period and the total duration of the plurality of periods.

None of the applied art discloses or suggests (a) control means responsive to a plurality of dwell periods, or (b) means for indicating the difference between the predetermined period and the total duration of the plurality of periods.

The Examiner states that "Choi discloses a device comprising an indicator (level meter inside

the sub-screen as shown in Fig. 3) which shows the remaining time before an activation signal (selection) is optionally applied (col. 2, lines 60-64, col. 3, lines 40-42, 48-54)." (Office Action, p. 9).

There are several problems with extracting this particular element from Choi. The first is that the Choi reference is not pertinent prior art under 35 U.S.C. §103. Choi would not have been known to a person having ordinary skill in the art to which the present Application pertains. Choi does not lie within the field of endeavor of the present Application. Choi relates to "a display apparatus for informing a user of a previously programmed recording in which, if it is time to record, a programmed recording mode is displayed on a television (TV) screen in a sub-screen, and more particularly to, a display apparatus for informing a user of a programmed recording in which a relevant message is generated through a PIP (picture in picture) circuit. The message can be generated during both a regeneration mode of a VCR (Video Cassette Recorder) or a TV broadcasting mode." (Choi, col. 1, lines 7-16). A person of ordinary skill in the art of the present Application would have no reason to consult the art of VCR programming.

Choi addresses a problem not even remotely related to the present Application. As stated in Choi, "Generally, when a viewer wants to record a predetermined program of the TV with the VCR, the viewer inputs a recording time, a broadcasting channel and a broadcasting program in advance. Then, when it is the programmed recording time corresponding to the current time, the programmed broadcasting channel is automatically selected and the VCR is subjected to the recording mode, so that the input broadcasting program is automatically recorded. Therefore, at the programmed recording time, the programmed broadcasting program to record is unconditionally recorded even when the viewer is currently watching the TV or watching a regenerated program of the VCR.

"Accordingly, in the case where the viewer does not want to carry out the programmed recording, but wants to continue watching, since the recording mode of the VCR has to be converted to the original mode manually by the viewer, the viewer can not continue his watching without any interruption." (Choi, col. 1, lines 18-36).

The problem addressed by Choi is not reasonably pertinent to the problem addressed by the present Application, and in particular the problem addressed by claim 104: producing an indication of progress toward or away from *selection* of a menu option.

As previously noted in connection with claim 20, Ito explicitly states that one of his goals is to *reduce* the number of icons displayed by the display device, allowing the screen of the display device to be used effectively. (Ito col. 2, lines 31-33). Ito's purpose is that "the *entire* display area can be used to display given contents." (Ito, col. 7, lines 12-13, emphasis added). Moving a dwell indicator

onto the display is contrary to Ito's express purpose. Thus Ito teaches away from this modification. In re *Gordon, Ibid.*

Assuming *arguendo* that Choi is pertinent, combinable prior art, Choi's teaching is very different from the indicator of claim 104. In Choi, the level meter is not responsive to a location indicated by a movement related signal, to a period of intersection of successive locations indicated by a movement related signal and a selectable region, or to a period of non-intersection of successive locations indicated by a movement related signal and a selectable region. In Choi, the level meter is unaffected by the viewer. The viewer cannot increase or decrease the level shown by the level meter. In claim 104, the indicator is responsive, not to a preprogrammed time, but to the difference between the times of a first and second location. Both locations are indicated by the user. Thus user movement affects the indicator of claim 104. The indicator of claim 104 is interactive.

Choi's invention is not directed to menu selection. In Choi, the level meter is not indicative of time to selection, but of time to the beginning of recording. The viewer is free to ignore level meter. Its purpose is just to notify viewer that he can override recording. If the viewer does nothing, recording occurs as previously programmed. In contrast, claim 104 is directed to menu selection. If there is no user interaction, then there is no intersection of a location and a selectable region, and no selection.

The lack of applicability of Choi's level meter to interactive use is best illustrated by an example of selection responsive to a plurality of periods of intersection of the successive locations and the particular selectable region. In the preferred embodiment, dwell time is dynamic -- it accumulates when the successive locations intersect the particular selectable region, and it decays after an initial period of intersection followed by a period of non-intersection. The dwell indication is also dynamic, indicating the fluctuating time remaining to selection. The time remaining to selection, however, fluctuates responsive to the successive locations. In contrast, Choi's level meter is a countdown timer, starting at a fixed time prior to recording start time, and counting down to recording start time. Choi's level meter is not responsive to intersection or non-intersection of locations indicated by a user.

The dwell indicator of claim 104 provides a result not achieved by the proposed combination. Some disabled users, e.g. individuals who drift, can point relatively easily to their intended targets for short periods of time, but have difficulty pointing for long periods. If such an operator knows that only a little more accurate pointing time is needed he may be able to satisfy the dwell time required for selection, without preparing himself to point accurately for an extended period. In addition, by

providing an indication of remaining dwell time, the indicator allows the user to plan his next movement. Indeed, the user may even initiate movement prior to selection of the intersected selectable region if he judges that the time required for him to exit the intersected selectable region is less than the time remaining to selection.

Claim 104 is considered patentable independent of its parent claim.

Claim 112, depending from claim 73, specifies that the control means moves the cursor *only* with the polygon.

The combination put forth in the Office Action does not contain a confining polygon, either on the display or elsewhere.

The new result achieved through the confining polygon has already been addressed in connection with claim 19.

Claim 112 is believed patentable independent of its parent claim.

Independent claim 74 is directed to a device controller comprising: (a) means for displaying a plurality of selectable regions within a polygon on a surface, each selectable region adjacent a side of the polygon and each selectable region associated respectively with a device control function, the plurality of selectable regions together at least partially circumscribing a region of the polygon; (b) signal generating means coupled to a device for generating a device control signal; and (c) control means for: (1) receiving a movement related signal and moving at least part of a cursor only within the polygon in response to the received movement related signal; and (2) in response to a selection event, generating a device control signal corresponding to the device control function associated with the one of the plurality of selectable regions intersected by the cursor.

Independent claim 74 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito does not disclose or suggest a device controller. Ito discloses a data entry application (Ito, FIG. 9) and the commands cancel, next page, previous page, and reset (Ito, FIG. 6, 13).

The patentable significance of a perimeter menu *on* the display has already been discussed in connection with claim 20. The functional difference and advantage over the applied art of moving the cursor *only* within a polygon on the display has already been discussed in connect with claim 19.

Independent claim 74 is believed patentable.

In claim 75, depending from claim 74, the device includes any one of a wheelchair, a household appliance, an appliance for use in an office, a workstation, a robot, and a computer peripheral. Claim 75 is considered patentable.

Independent claim 76 is directed to an apparatus for editing a document. The apparatus comprises: (a) means for selecting a first sequence of one or more graphic symbols from a plurality of sequences of one or more graphic symbols, at least part of each of the plurality of sequences having a common attribute for optical recognition purposes; (b) means for inputting the first sequence into the document; (c) means for delimiting on a display a plurality of selectable regions, the plurality of selectable regions together at least partially circumscribing a region on the display, at least two of the selectable regions associated respectively with a sequence of the plurality of sequences; (d) means for displaying on the display the at least two sequences of the plurality of sequences associated with the at least two selectable regions; (e) means for receiving a movement related signal and moving a cursor on the display responsive thereto; and (f) in response to a selection event wherein the cursor at or near the time the selection event occurs intersects any one of the at least two selectable regions, means for inputting the sequence associated with the intersected selectable region into the document.

Independent claim 76 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito does not disclose or suggest optical recognition and common attributes for optical recognition purposes. The patentable significance of selectable regions *on* the display has already been discussed in connection with claim 20.

Independent claim 76 is considered patentable.

The apparatus of claim 77, depending from claim 76, adds means, responsive to the selection event, for deleting the first sequence from the document. Claim 77 is considered patentable.

Independent claim 78 is directed to a method of selecting a menu option from a plurality of menu options. The method is for use with a surface comprising a display area. The method comprises the steps of:

at least partially delimiting a plurality of selectable regions, each of the selectable regions associated respectively with a menu option and each of the selectable regions including an invisible subregion outside the display area and a visible subregion on the display area, the plurality of visible subregions together at least partially circumscribing a region on the display area;

receiving a movement related signal indicating successive locations with respect to the display area; and

selecting, in response to a dwell event associated with one of the selectable regions, the menu option associated with the selectable region associated with the dwell event.

Independent claim 78 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 -

p.8, line 2).

The method of claim 78 differs from the method disclosed by Ito and all the applied references in delimiting an *invisible* selection subregion. Neither this step nor this structure is disclosed or suggested in the applied art. The patentable significance of visible subregions of selectable regions *on* the display has already been discussed in connection with claim 20. The patentable significance of a selection device responsive to dwell has already been discussed in connect with claim 19.

Independent claim 78 is considered patentable.

Independent claim 79 is directed to a method of selecting a menu option from a plurality of menu options. The method is for use with a human interface system wherein a body member of an operator may indicate successive locations on a surface, the surface including a display area, the display area having thereon a plurality of selectable regions, each of the selectable regions associated respectively with a menu option and the plurality of selectable regions together at least partially circumscribing a region on the display area. The method comprises the steps of:

confining each of the successive locations to the display area; and

selecting, in response to a dwell event associated with one of the selectable regions, the menu option associated with the selectable region associated with the dwell event.

Independent claim 79 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

The patentable significance of selectable regions *on* the display has already been discussed in connection with claim 20. The functional difference and advantage over the applied art of a confiner for confining the cursor within to the display area, the patentable significance of a selection device responsive to dwell, and the non-combinability of the applied art, have already been discussed in connect with claim 19.

Independent claim 79 is considered patentable.

Independent claim 80 is directed to a method of speaking using a voice output system including a display and a voice output device. The method comprises the steps of:

displaying a plurality of selectable regions within a polygon on the display, each selectable region adjacent a side of the polygon and one or more of the selectable regions associated respectively with a sequence of one or more characters, the plurality of selectable regions together at least partially circumscribing a region on the display;

receiving a movement related signal and moving at least part of a cursor only within the

polygon responsive to the movement related signal;

repetitively:

(i) in response to a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of the cursor and one of the one or more selectable regions, selecting the sequence associated with the intersected selectable region; and

(ii) appending the selected sequence to at least one previously selected sequence; and

speaking, by means of the voice output device, the word spelled by the appended sequences.

Independent claim 80 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Baker, Golding, and Lazzaro (Office Action, p.7, lines 4-5).

Claim 80, a method claim, introduces an additional factor which must be considered: the user's motivation for employing this method. Users of voice output systems often have a systemic disorder affecting their motor control. One symptom of the disorder is impaired speech. Another symptom is impaired ability to voluntarily stop motion, resulting in a tendency to overshoot on-screen targets. Others symptoms may include reduced ability to prevent the movement of parts of the body, including the head, limbs and digits, muscle stiffness, weakness, limited range of motion, abnormal posture, involuntary muscle tremors, involuntary muscle activity causing involuntary motion, impaired ability to voluntarily stop motion, impaired ability to coordinate muscle activity, and/or impaired ability to sense the position of a part of the body. Any one of these symptoms may impair an affected individual's fine motor control. Due to these symptoms, and particularly impaired ability to voluntarily stop motion, individuals with neuromuscular disorders tend to overshoot on-screen target areas. The *combination* of displaying the selectable regions within a polygon and adjacent its side, and moving at least part of a cursor *only* within the polygon enables some of these individuals to select targets they otherwise could not, or to do so more quickly or with less effort and concomitant fatigue.

The patentable significance of displaying selectable regions *on* the display has already been discussed in connection with claim 20. The functional difference and advantage over the applied art of confining the cursor within to the display area, the patentable significance of selecting responsive

to dwell, the patentable significance of appending successively selected letters, and the non-combinability of the applied art, have already been discussed in connect with claims 19 and 73.

Independent claim 80 is considered patentable.

Independent claim 85 is directed an apparatus for selecting a menu option from a plurality of pluralities of menu options. The apparatus comprises: (a) a surface; (b) means for delimiting a plurality of selectable regions on the surface, the plurality of selectable regions together at least partially circumscribing a region on the surface; (c) a pointer, responsive to the movement of a body member of a user, for indicating successive locations on the surface; (d) sensor signal receiving means for receiving a sensor signal; and (e) selection means (1) responsive to the sensor signal, for associating each of the selectable regions respectively with the menu options of one of the plurality of menu options, and (2) responsive to a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the durations of one or more successive periods of intersection of two or more of the successive locations and a particular selectable region, for selecting the menu option associated with the particular selectable region.

Independent claim 85 stands rejected under 35 U.S.C. §103 based upon the combination of Ito and Lazzaro (Office Action, p.7, lines 6-7).

Neither Ito nor Lazzaro discloses or suggests a plurality of pluralities of menu options, or selecting one of the plurality of pluralities of menu options, or associating each of the selectable regions respectively with the menu options of one of the plurality of menu options. Far from supporting dynamically created associations, Ito's commands are static, as shown in Ito FIG. 5. "The upper surface of the casing of transparent tablet 2 bears labels indicating the commands assigned to the regions 25A, 25B and 25C." (Ito, col. 4, lines 36-38). Because these commands are static, they should be "used commonly in a plurality of application programs." (Ito col. 8, lines 16-17).

Independent claim 85 combines selection of a menu, responsive to a sensor signal, with selection of a menu option from that menu. Neither Ito nor Lazzaro discloses or suggests this combination. The patentable significance of selection means responsive to dwell, and the non-combinability of the applied art, have already been discussed in connect with claim 19. Atkinson, though not made a basis for the rejection of independent claim 85, is discussed in connection with claim 33.

Independent claim 85 is considered patentable.

Claim 86, depending from claim 85, adds indicating means for indicating which plurality of menu options is associated with the selectable regions. Claim 85 is deemed patentable.

In claim 101, depending from claim 86, the selected menu option represents a sequence of one or more words; and further comprising a voice output device for speaking the sequence of one or more words responsive to the selection means selecting the selected menu option. None of the applied art discloses a menu option representing a sequence of one or more words. Claim 101 is believed patentable.

Claim 102, depending from claim 86, further comprises a plurality of selectable regions outside the surface, each associated respectively with one of the selectable regions on the surface. The first dwell event includes a first quantity equalling or exceeding a predetermined quantity. The first quantity is a function of: (a) the durations of one or more successive periods of intersection of two or more of the successive locations and one of the selectable regions on the surface; and (b) the durations of one or more successive periods of intersection of two or more of the successive locations and the selectable region outside the surface associated with the intersected selectable region on the surface.

The Examiner proposes to modify Ito to *move* Ito's selection regions onto the display. "[I]t would have been obvious to one having ordinary skill in the art at the time the invention was made to modify each of the selectable region in Fig. 2 of Ito to be adjacent a side of the polygon on the display" (Office Action, p.4). Assuming *arguendo* that this is so, this modification still does not describe the structure of claim 102 which includes selectable regions *both* on and outside the surface.

None of the applied art discloses or suggests the *combination* of selectable regions on *and* outside the surface, as claimed in claim 102. As previously discussed, Lazzaro does not address selectable regions outside the display, let alone selecting a selectable region *on* the surface using dwell time for an associated selectable regions *outside* the surface. Claim 102 is believed patentable independent of its parent claim.

Claim 103, depending from claim 86, adds signal generating means coupled to a device for generating a device control signal corresponding to a device control function. The selected menu option represents the device control function. The signal generating means, in response to the dwell event, generates the device control signal represented by the selected menu option.

The patentable significance of a device controller has already been discussed in connection with claim 74. Claim 104 is believed patentable independent of its parent claim.

In claim 105, depending from claim 85, the sensor signal is responsive to a sound.

None of the applied art discloses or suggests an apparatus *responsive* to a sound. Claim 105 is deemed patentable independent of its parent claim.

In claim 87, depending from claim 85, the selection means is further responsive to the sensor signal equalling or exceeding a predetermined signal level. None of the appliedart discloses or suggests comparing a sensor signal to a predetermined signal level. Claim 87 is deemed patentable independent of its parent claim.

In claim 88, depending from claim 87, the selection means is further responsive to the sensor signal equalling or exceeding the predetermined signal level for a predetermined period. This is different from dwell. In selection by dwell, the timed event is the intersection of a location and a selectable region. In claim 88, the timed event is the sensor signal equalling or exceeding the predetermined signal level. None of the applied art, including Lazzaro, discloses or suggests a sensor signal equalling or exceeding a predetermined signal level for a predetermined period. Claim 88 is considered patentable independent of its parent claim.

Independent claim 89 is directed to menu option selector for use with a human interface system wherein a body member of an operator may indicate a location on a surface. The menu option selector comprises: (a) the surface including a display area, the display area having thereon a plurality of pluralities of selectable regions, each of the pluralities of selectable regions at least partially circumscribing a region on the display area; (b) a sensor for sensing an actual or attempted muscle activation of the operator and, responsive thereto, for associating each selectable region of one of the pluralities of selectable regions respectively with a menu option; (c) a clipper for generating, in response to the location indicated by the body member of the operator indicating a location outside the display area, a clipped location indicative of a location on the display area; and (d) a selector for selecting, in response to a selection event, the menu option associated with the selectable region intersected by the clipped location.

Independent claim 89 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito, the sole basis for the rejection of claim 89, does not disclose or suggest means for selecting a menu option for a plurality of pluralities of menu options, means for displaying selectable regions *on* the display, a clipper, or the combination of the selection of a menu, responsive to a sensor signal, with selection of a menu option from that menu.

Independent claim 89 combines selection of a menu, responsive to a sensor signal, with selection of a menu option from that menu. The patentable significance of a selection device for selecting a menu option for a plurality of pluralities of menu options; of selectable regions *on* the display; of combining the selection of a menu, responsive to a sensor signal, with selection of a menu

option from that menu; and of a clipping device; have already been discussed in connection with claims 33, 20, 85, and 61, respectively. Independent claim 89 is believed patentable.

Independent claim 94 is directed to a voice output system for a user having impaired motor control. The voice output system comprises: (a) a display screen; (b) a delimit device completely delimiting an invisible selectable region outside the display screen associated with a sequence of one or more words; (c) a voice output device; (d) a movement related signal receiver for receiving a movement related signal indicating successive locations with respect to the display screen; and (d) a selection device, responsive to a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the durations of one or more successive periods of intersection of two or more of the successive locations and the selectable region outside the display screen, for selecting the selectable region; whereby the user may select the selectable region outside the display and speak, with the voice output device, the sequence of one or more words.

Independent claim 94 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito, the sole basis for the rejection of claim 94, does not disclose or suggest a delimit device delimiting an *invisible* selectable region, associating the selectable region with a sequence of one or more words, a voice output device, or selection by dwell.

The patentable significance of a delimit device for delimiting an *invisible* selectable region outside the display screen; associating the selectable region with a sequence of one or more words; a voice output device; and selection by dwell; have already been discussed in connect with claims 78, 101, 73, and 19, respectively. Independent claim 94 is believed patentable.

Independent claim 106 is directed to an apparatus in a voice output system for a user having impaired motor capability. The apparatus is for selecting a menu option associated with an overshot selectable subregion on a display screen. The apparatus comprises: (a) a voice output device; (b) the display screen; (c) a menu comprising a plurality of menu options, each associated respectively with a sequence of one or more letters; and (d) control means for: (1) delimiting a plurality of selectable regions, each of the selectable regions associated respectively with one of the plurality of menu options, and each of the selectable regions including a subregion outside and adjacent the display screen and a subregion on the display screen, the subregion outside and adjacent the display screen and the subregion on the display screen adjacent one another, the plurality of the subregions on the display screen together at least partially circumscribing a region on the display screen; (2) receiving a movement related signal indicating successive locations with respect to the display screen; (3) in

response to a succession of dwell events, each including an intersection of a first one and a second one of the successive locations and one of the subregions outside and adjacent the display screen, selecting the sequence of one or more letters associated with each of the intersected subregions, and appending the selected sequence to at least one previously selected sequence; and (4) speaking, by means of the voice output device, the word spelled by the appended sequences.

Independent claim 106 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

The patentable significance of selectable subregions on the display screen; selectable subregions outside the display screen; a confiner; means for accommodating overshoot; and a selection device for selecting responsive to a dwell event; and control means for appending successively selected letters into a word, have each been discussed in connect with claims 20, 1, 22, 19, 19, and 73, respectively. Independent claim 106 is believed patentable.

In claim 113, depending from claim 106, each of the succession of dwell events includes a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the difference in time between the occurrence of the second successive location and the first successive location. Claim 106 is deemed patentable.

Independent claim 114 is directed to a voice output system comprising: (a) a display screen including a working region with a periphery; (b) a movement related signal receiver for receiving a movement related signal indicating a location with respect to the display screen responsive to user movement by a user, the user movement indicating a potential user selection; (c) a delimit device for delimiting selectable regions adjacent the periphery of the working region, each of the selectable regions selectable by the user and having an external boundary wherein the external boundary includes the side of the selectable region furthest from the working region and having either a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or having an activation area extending beyond the external boundary of the selectable region and beyond the display screen, each of the selectable regions associated respectively with and simultaneously displaying a first sequence of one or more characters, a first sequence of one or more words, or a first sequence of one or more symbols representing the first sequence of one or more words; and (d) a voice output device for speaking the first sequence of one or more characters and/or words associated with a first particular selectable region responsive to a first intersection of the movement related signal and the first particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select the first

particular selectable region while overshooting the first particular selectable region or by providing a confiner to the first particular selectable region for the movement related signal.

Independent claim 114 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito does not disclose or suggest selectable regions having either a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or having an activation area extending beyond the external boundary of the selectable region and beyond the display screen. The voice output system of claim 114 accomodates overshoot by providing the user with the ability to select the first particular selectable region while overshooting the first particular selectable region or by providing a confiner to the first particular selectable region for the movement related signal. Ito lacks this functionality. Ito's selection regions do not display anything. The selection regions are blank. Ito, FIG. 5 and 12. In contrast, in the voice output system of claim 114, the selectable regions simultaneously display a first sequence of one or more characters, a first sequence of one or more words, or a first sequence of one or more symbols representing the first sequence of one or more words. Ito does not disclose or suggest a voice output device.

The patentable significance of accommodating overshoot with selectable regions outside the display screen; of accommodating overshoot with a confiner; and of a voice output device; have already been discussed in connection with claims 1, 22 and 73, respectively. Independent claim 114 is believed patentable.

In claim 115, depending from claim 114, the voice output device is further responsive to a period of the intersection of the movement related signal and the first particular selectable region or the activation area associated therewith, the period of intersection equalling or exceeding a predetermined period.

The patentable significance of selection by dwell has already been discussed in connection with claim 19. Claim 115 is believed patentable independent of its parent claim.

In claim 116, depending from claim 115, the voice output device is *only* responsive to the period of the intersection of the movement related signal and the first particular selectable region or the activation area associated therewith equalling or exceeding the predetermined period for speaking the first sequence of one or more characters and/or words associated with the first particular selectable region. Claim 116 is considered patentable.

In claim 117, depending from claim 115, the predetermined period equals or exceeds two

hundred milliseconds. Claim 117 is considered patentable.

Claim 202, depending from claim 115, adds a user fatigue detector for detecting fatigue of the user. The predetermined period is a function of detected user fatigue. While some individuals affected by a neuromuscular disorder are able to exercise fine motor control with enormous effort, the struggle to do so often fatigues the individual, limiting the period of time the individual is capable or comfortable performing the fine motor control task (Specification, p.2, lines 5-13).

None of the applied are discloses or suggests a user fatigue detector.

In claim 118, depending from claim 114, none of the selectable regions is adjacent another of the selectable regions. Each of Ito's selection regions is adjacent at least one other selection region. Claim 118 is believed patentable independent of its parent claim.

In claim 119, depending from claim 114, the delimit device is further operative to delimit a second selectable region outside the working region and adjacent one of the first selectable regions, the second selectable region selectable by the user and having an external boundary wherein the external boundary includes the side of the selectable region furthest from the working region, the second selectable region having a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the second selectable region or having an activation area extending beyond the external boundary of the second selectable region, the second selectable region associated with a second sequence of one or more characters, a second sequence of one or more words, or a second sequence of one or more symbols representing the second sequence of one or more words.

Claim 119 is believed patentable.

In claim 120, depending from claim 114, a particular confiner of at least one of the selectable regions is further operative to confine the movement related signal within a particular side of the selectable region other than the external boundary.

None of the applied references discloses or suggests confining the movement related signal, either on one side, or on two sides as claimed in claim 120. Claim 120 is considered patentable independent of its parent claim.

In claim 121, depending from claim 120, the particular confiner, responsive to any one of: (a) a path of the movement related signal; (b) a change of direction of the movement related signal; (c) a velocity of the movement related signal; (d) an acceleration or deceleration of the movement related signal; and (e) a change in the acceleration or deceleration of the movement related signal; may allow the movement related signal to pass through the particular side of the selectable region.

None of the applied art discloses or suggests a penetrable confiner. Claim 121 is considered patentable independent of its parent claim.

In claim 122, depending from claim 114, a first cursor is displayed on the display screen at or near the location indicated by the movement related signal and a second cursor differing in appearance from the first cursor is displayed on the display screen responsive to the location indicated by the movement related signal intersecting or nearly intersecting the external boundary of the particular of the selectable region.

None of the applied art discloses or suggests displaying two different cursors responsive to the location indicated by the movement related signal. Claim 122 is considered patentable independent of its parent claim.

In claim 123, depending from claim 114, the voice output device is further responsive to an intersection of the movement related signal and one of the selectable regions for repeating the previously spoken first sequence of one or more words.

None of the applied art discloses or suggests repeating previously spoken words. Claim 123 is considered patentable independent of its parent claim.

In claim 124, depending from claim 123, the repeated sequence of one or more words is spoken either more loudly or more slowly than the previously spoken sequence.

None of the applied art discloses or suggests repeating the previously spoken words differently than when previously spoken. Claim 124 is considered patentable independent of its parent claim.

In claim 125, depending from claim 114, the previously selected first sequence may be deleted prior to being spoken by the voice output device, the deletion being responsive to an intersection of the movement related signal and one of the selectable regions. Claim 125 is considered patentable.

In claim 126, depending from claim 114, each of the selectable regions is located outside the display screen.

The patentable significance of selectable regions outside the display screen has already been discussed in connection with claim 1. Claim 126 is considered patentable.

Claim 127, depending from claim 126, adds indicators on the display screen, each indicator associated respectively with one of the selectable regions and indicating the location of the associated selectable region.

Ito does not disclose or suggest location indicators *on* the display screen. Ito teaches against placing anything other than "given contents" of an application on the display screen (Ito, col. 7, lines 12-13), as was already discussed in connection with claim 20. Claim 127 is believed patentable

independent of its parent claim.

In claim 128, depending from claim 127, the first particular indicator associated with the first particular selectable region may indicate the intersection of the movement related signal and the first particular selectable region.

Ito does not disclose or suggest location indicators *on* the display screen for indicating an intersection.

In claim 129, depending from claim 114, the voice output device is at least partially disabled in response to an intersection of the movement related signal and one of the selectable regions or the activation area associated therewith.

None of the applied art disclose or suggest disabling any part of a device in whole or in part. Claim 129 is deemed patentable independent of its parent claim.

In claim 130, depending from claim 129, the voice output device, in response to an intersection of the movement related signal and one of the selectable regions or the activation area associated therewith, is restored to the functionality it had prior to the at least partial disabling of the voice output device.

None of the applied art disclose or suggest enabling any part of a device after disabling it. Claim 130 is deemed patentable independent of its parent claim.

Claim 131, depending from claim 114, adds a computer system capable of executing an application program which may display at least part of its output in the working region; and wherein at least one of the first sequence of characters, words, or symbols represents an input to the application program.

Claim 131 is considered patentable.

Claim 131, depending from claim 131, adds a pointer selected from the group consisting of a (1) mouse; (2) trackball; (3) joystick; (4) stylus and graphics tablet; (5) lightpen; (6) thumb wheel; (7) touch screen; (8) head pointer; (9) intraoral pointer; and (10) eye tracker, the pointer coupled to the computer system; and wherein the movement related signal is responsive the pointer and the pointer is responsive to the user movement.

Claim 132 is considered patentable.

In claim 133, depending from claim 114, the user movement is the movement of a body member of the user including any one of: (a) the head of the user; (b) an eye of the user; (c) a shoulder of the user; (d) an arm of the user; (e) an elbow of the user; (f) a wrist of the user; (g) a hand of the user; (h) a finger of the user; (i) a thumb of the user; (j) a knee of the user; (k) a leg of the user;

(l) a foot of the user; (m) a toe of the user; (n) an ankle of the user; and (o) the trunk of the user.

Claim 133 is considered patentable.

In claim 169, depending from claim 114, the voice output device is further responsive to a path of the user movement to the first particular selectable region or the activation area associated therewith.

None of the applied art discloses or suggests either selection or voice output responsive to a *path* of user movement.

Claim 169 is considered patentable independent of its parent claim.

Claim 199, depending from claim 114, adds: (a) a computer system including the display screen and the movement related signal receiver; and (b) a program, executable on the computer system. Each of the delimit device and the selection device is formed by the combination of the program and the computer system.

Claim 199 is considered patentable.

In claim 200, depending from claim 114, the voice output device is further responsive to a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of a ratio between: (1) the durations of one or more successive periods of intersection of the movement related signal and the first particular selectable region or the activation area associated therewith; and (2) the durations of one or more successive periods of intersection of the movement related signal and one of the selectable regions or the activation area associated therewith other than the particular selectable region.

None of the applied art discloses or suggests selection or speech responsive to a ratio of dwell times. Claim 200 is considered patentable independent of its parent claim.

In claim 201, depending from claim 114, the location indicated by the movement related signal is outside the display screen. The voice output system further comprising an indicator for indicating on the display screen the distance between the location indicated by the movement related signal outside the display screen and the point on the display screen closest thereto.

None of the applied art discloses or suggests indicating the distance between a location outside the display screen and the display screen.

Claim 201 is believed patentable independent of its parent claim.

Independent claim 134 is directed to a voice output system comprising: (a) a surface including a selectable region selectable by a user and associated with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one

or more words; (b) movement related signal receiving means for receiving a movement related signal indicating a first location intersecting the selectable region and, at a later time, a second location intersecting the selectable region; (c) an indicator for indicating in a first manner at least the difference between the time the second location occurs and the time the first location occurs; and (d) a voice output device for speaking the sequence of one or more characters and/or words associated with the selectable region responsive to a first quantity that is a function of the difference equalling or exceeding a predetermined quantity.

Independent claim 134 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Golding, Lazzaro, and Choi (Office Action, p.7, lines 10-11).

The patentable significance of an indicator for indicating remaining dwell time and the non-combinability of Ito with Choi have already been discussed in connection with claim 104. All these reasons for patentability are applicable to the indication of the duration of the period of between the occurrence of the first and second locations as claimed in claim 134.

Independent claim 134 is deemed patentable.

In claim 135, depending from claim 134, the indication of the difference includes any one of: (a) a visible signal; (b) an audible signal; and (c) a tactile signal.

Claim 135 is believed patentable.

In claim 136 as amended, depending from claim 134, the indicator further indicates a second quantity which is a function of the difference between (a) a predetermined period; and (b) the difference between the time the second location occurs and the time the first location occurs.

Claim 136 is believed patentable.

In claim 137, depending from claim 134, the movement related signal further indicates, at a time later than the time the second location occurs, a third location not intersecting the selectable region and the indicator is further operative to indicate the non-intersection of the third location and the selectable region.

None of the applied art, including Choi, indicates a *non-intersection* following a period of intersection. Claim 137 is considered patentable independent of its parent claim.

In claim 138, depending from claim 134, the movement related signal further indicates, at a time later than the time the second location occurs, a third location not intersecting the selectable region and, at a later time, indicates a fourth location not intersecting the selectable region and the indicator is further operative to indicate at least the difference between the time the fourth location occurs and the time the third location occurs.

None of the applied art, including Choi, indicates a *period of non-intersection* following a period of intersection. Claim 138 is considered patentable independent of its parent claim.

In claim 139, depending from claim 138, the indicator is further operative to produce an output signal which varies in at least one way as the difference between the time the second location occurs and the time the first location occurs increases and varies in at least the opposite way as the difference between the time the fourth location occurs and the time the third location occurs increases.

Choi's level meter counts down only. The indicator of claim 139 varies in two opposite ways. None of the applied art discloses or suggests such an indicator. Claim 139 is considered patentable independent of its parent claim.

In claim 140, depending from claim 134, the indication in the first manner includes a modification in brightness.

None of the applied art, including Choi, discloses or suggests a level meter or indicator which varies in brightness.

Claim 140 is considered patentable independent of its parent claim.

In claim 141, depending from claim 134, the indicator is further operative to indicate in a second manner the first quantity equalling or exceeding the predetermined quantity.

Claim 141 is considered patentable.

In claim 142, depending from claim 141, the indication in the first manner includes a slight modification and the indication in the second manner includes a marked modification.

None of the applied art combines two different types of indications, one for dwelling and one for selection. Claim 142 is deemed patentable independent of its parent claim.

In claim 143, depending from claim 141, the indication in the second manner includes a modification in hue.

None of the applied art, including Choi, discloses or suggests an indicator which varies in hue.

Claim 143 is deemed patentable independent of its parent claim.

In claim 144, depending from claim 134, the indicator intersects the selectable region.

Claim 144 is deemed patentable.

In claim 145, depending from claim 144, the indicator and the selectable region are coterminous.

Claim 144 is deemed patentable.

Claim 146, depending from claim 134, adds a confiner for preventing the movement related signal indicating the first and second locations from moving beyond a side of the selectable region.

The patentable significance of a confiner has already been discussed in connection with claim 22.

Independent claim 147 is directed to a voice output system comprising: (a) a display area including a working region with a periphery; (b) a movement related signal receiver for receiving a movement related signal indicating a location with respect to the display area responsive to user movement by a user, the user movement indicating a potential user selection; (c) a menu hierarchy including a menu comprising a plurality of menu options, a specific one of the menu options associated with a submenu comprising a plurality of submenu options, each of the submenu options associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing the sequence of one or more words; (d) a delimit device for delimiting a first and second plurality of selectable regions adjacent the periphery of the working region, each of the selectable regions selectable by the user and having an external boundary wherein the external boundary includes the side of the selectable region furthest from the working region and having either a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or having an activation area extending beyond the external boundary of the selectable region and beyond the display area, a specific one of the first plurality of selectable regions associated with the specific menu option and each of the second plurality of selectable regions associated respectively with and simultaneously displaying one of the submenu options; and (e) a voice output device for speaking the particular sequence of one or more characters and/or words associated with a particular one of the second plurality of selectable regions responsive to a first intersection of the movement related signal and the specific selectable region or the activation area associated therewith and thereafter to a second intersection of the movement related signal and the particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select each of the specific and the particular selectable regions while overshooting the specific or the particular selectable region or by providing a confiner to the specific or the particular selectable region for the movement related signal.

Independent claim 147 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito does not disclose or suggest a voice output device or a voice output system; a menu hierarchy; selectable regions each displaying its associated submenu option; or accommodating overshoot; each already discussed in connection with claims 73, 33, 20, and 19, respectively.

Independent claim 147 is believed patentable.

In claim 148 as amended, depending from claim 147, the specific menu option either includes at least part of the particular sequence, or represents a class of characters or words, the class including the particular sequence.

Claim 148 is considered patentable.

In claim 149, depending from claim 148, the class is any one of: (a) a class of characters having a common element in Morse code; (b) a part of speech; (c) a meaning; (d) a physical characteristic; (e) a functional characteristic; (f) a direction; (g) a class of characters having an extension at least a predetermined distance above a baseline; and (h) a class of characters having an extension below a baseline.

Claim 149 is considered patentable.

Claim 150 depends from claim 148. In claim 150, responsive to the selection of the menu option, the individual characters, words, or symbols associated therewith are associated respectively with and simultaneously displayed by the second plurality of selectable regions for eventual selection by the user. Claim 150 is deemed patentable.

Claim 151 depends from claim 148. Claim 151 addresses the *distance* on the display area between the specific selectable region and each of at least two of the second plurality of selectable regions. This distance is responsive to a relative frequency of use of the sequence of characters, words, or symbols associated with each of the at least two selectable regions. None of the applied art addresses the distance between a menu option associated with a submenu and the submenu options. Claim 151 is considered patentable independent of its parent claim.

In claim 152, depending from claim 151, the sequence of characters, words, or symbols associated with one of the at least two selectable regions is more frequently used than the sequence of characters, words, or symbols associated with another one of the at least two selectable regions. The distance between the specific selectable region and the one of the at least two first selectable regions associated with the *more frequently* used sequence is *less than the distance* between the specific selectable region and the another one of the at least two first selectable regions. None of the applied art discloses or suggests this feature. Claim 152 is considered patentable independent of its parent claim.

Claim 153 depends from claim 148. In claim 153 the position of at least two characters, words, or symbols within the displayed specific sequence *indicates the position* of the one of the second plurality of selectable regions on the display area associated with the character, word, or symbol. None of the applied references disclose or suggest this feature. Claim 153 is considered

patentable independent of its parent claim.

Claim 154, depending from claim 147, further limits the symbols described in its parent claim to one of the listed species. None of the applied references disclose or suggest the combination of claim 154. Claim 154 is deemed patentable.

In claim 167, depending from claim 147, the delimit device is further operative to delimit a shared region on the display screen, and wherein one of the first selectable regions and one of the second selectable regions each includes the shared region. None of the applied references disclose or suggest the combination of claim 167. Indeed, Atkinson is concerned with *avoiding* menu overlap (Atkinson, col. 6, lines 52-55). Claim 167 is deemed patentable.

In claim 168, depending from claim 147, the delimit device is further operative to delimit a plurality of shared regions, each shared region on the display screen and each associated respectively with one of the first plurality of selectable regions and with one of the second plurality of selectable regions; and wherein each of the first selectable regions and each of the second selectable regions includes the associated shared region.

None of the applied references disclose or suggest the combination of claim 167. Claim 168 is considered patentable.

Claim 203, depending from claim 147, the specific menu option represents a class of related words, related sequences of words, or a combination thereof. The claim limits the classes to one of the listed species. None of the applied references disclose or suggest the combination of claim 203 Claim 203 is deemed patentable.

Independent claim 155 is directed to a voice output system. The system includes a display area including a working region with a periphery. Selectable regions are located adjacent the periphery of the working region. Each of the selectable regions has an external boundary which includes the side of the selectable region furthest from the working region. Additionally, each selectable region either has a confiner for preventing a movement related signal indicating a location from moving beyond the external boundary of the selectable region or has an activation area extending beyond the external boundary of the selectable region and beyond the display area. Each selectable region is associated respectively with and simultaneously displays a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing the sequence of one or more words. Selection is responsive to a *plurality of periods* of intersection of the movement related signal and a particular selectable region or the activation area associated therewith. The selected sequence is spoken by a voice output device. The voice output

system provides the user with the ability to select a particular selectable region while overshooting the particular selectable region.

Independent claim 155 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

None of the applied references disclose either (a) a confiner or activation areas outside the display area, or (b) selection responsive to the duration of a *plurality* of periods of intersection. The patentable significance of selection by dwell is discussed in connection with claim 19.

Independent claim 155 is believed patentable.

Claims 156 and 157 include a period of *non-intersection* of the movement related signal and the particular selectable region which affects when the particular selectable region is selected. In claim 155 selection is responsive to a quantity equalling or exceeding a predetermined quantity. The quantity is a function of the duration of a plurality of periods of intersection of the movement related signal and the particular selectable region or the activation area associated therewith. In claim 156, the quantity is further a function of a duration of non-intersection of the movement related signal and the particular selectable region or the activation area associated therewith. In claim 157, the quantity which must equal or exceed the predetermined quantity, varies one way as the duration of one of the periods of intersection increases and varies in an opposite way as the duration of the period of non-intersection increases. None of the applied references discloses or suggests selection responsive to a period of *non-intersection*. Claims 156 and 157 are each considered patentable independent of their respective parent claims.

Independent claim 158 is directed to an apparatus for selecting a menu option from a plurality of menu options, said apparatus. The apparatus comprises: (a) a display area including a working region with a periphery; (b) a movement related signal receiver for receiving a movement related signal indicating a location to be selected with respect to the display area responsive to a user selection by a user; (c) a delimit device for delimiting selectable regions adjacent the working region, each of the selectable regions having an external boundary wherein the external boundary is the side of the selectable region furthest from the working region, each of the selectable regions having a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or having an activation area extending beyond the external boundary of the selectable region, each of the selectable regions associated respectively with one of the menu options; and (d) a selection device for selecting the menu option associated with a particular one of the selectable regions responsive to an intersection of the movement related signal and the

particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select the particular selectable region while overshooting the particular selectable region with the movement related signal or by providing a confiner to the particular selectable region for the movement related signal.

Independent claim 158 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

Ito does not disclose or suggest selectable regions having either a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or having an activation area extending beyond the external boundary of the selectable region and beyond the display screen. The patentable significance of accommodating overshoot with selectable regions outside the display screen, and of accommodating overshoot with a confiner, have already been discussed in connection with claims 1, 22 and 114.

Independent claim 158 is believed patentable.

Independent claim 159, as amended, is directed to a voice output system comprising: (a) a display area including a working region with a periphery; (b) a display device for displaying menu options on the display area, each menu option displayed adjacent the periphery of the working region, each menu option associated respectively with a position of a user activatable switch outside the display area, the switch being positionable with respect to the location of each menu option for selection thereof, each menu option associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words, for selection via the switch; and (c) a voice output device for speaking the sequence of one or more characters or words associated with a particular menu option, in response to the position of the switch corresponding to the particular menu option for a period equalling or exceeding a predetermined time period.

Independent claim 159 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Golding, Lazzaro, and Anderson (Office Action, p.7, lines 12-13).

None of the applied art discloses or suggests either selecting a menu option or speaking in response to the position of a switch corresponding to a particular menu option for a period equalling or exceeding a predetermined time period. The patentable significance of displaying the at least partially circumscribing menu options on the display area; of a multi-position switch; and of speaking with a voice output device; have each been discussed in connect with claims 20, 67, and 73, respectively. Independent claim 159 is believed patentable.

Independent claim 160, as amended, is directed to a voice output system comprising: (a) a display area including a working region with a periphery; (b) a display device for displaying menu options on the display area, each menu option displayed adjacent the periphery of the working region, each menu option associated respectively with a position of a user activatable switch outside the display area, the switch being positionable with respect to the location of each menu option for selection thereof, each menu option associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words, for selection via the switch; and (c) a voice output device for speaking the sequence of one or more characters or words associated with a particular menu option, in response to the position of the switch corresponding to the particular menu option for a first time period equalling or exceeding a predetermined time period; and wherein the display device further includes an indicator for indicating at least the difference between the first time period and the predetermined time period.

Independent claim 160 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Golding, Lazzaro, and Anderson (Office Action, p.7, lines 12-13).

None of the applied art discloses or suggests either selecting a menu option or speaking in response to the position of a switch corresponding to a particular menu option for a period equalling or exceeding a predetermined time period. The patentable significance of menu options in a perimeter menu on the display area; of a multi-position switch; of a voice output device; and of an indicator for indicating the difference between the first time period and the predetermined time period; have each been discussed in connect with claims 20, 67, 73, and 104, respectively. Independent claim 160 is believed patentable.

Independent claim 161, as amended, is directed to a voice output system comprising: (a) a display area including a working region with a periphery; (b) a menu hierarchy including a menu comprising a plurality of menu options, a specific one of the menu options associated with a submenu comprising a plurality of submenu options, each of the submenu options associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing the sequence of one or more words; (c) a display device for displaying menu options and submenu options on the display area, each menu option displayed adjacent the periphery of the working region, each menu option associated respectively, and each submenu option associated respectively, with a position of a user activatable switch outside the display area, the switch being positionable with respect to the location of each menu option or submenu option for selection thereof;

and (d) a voice output device for speaking the particular sequence of one or more characters or words associated with a particular one of the submenu options, in response to the position of the switch corresponding to the specific menu option for a first time period equalling or exceeding a first predetermined time period and thereafter to the position of the switch corresponding to the particular menu option for a second time period equalling or exceeding a second predetermined time period.

Independent claim 161 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Golding, Lazzaro, Atkinson, and Anderson (Office Action, p.7, lines 14-15).

None of the applied art discloses or suggests either selecting a menu option or speaking in response to the position of a switch corresponding to a particular menu option for a period equalling or exceeding a predetermined time period. The patentable significance of a menu hierarchy; of menu options in a perimeter menu on the display area; of a multi-position switch; and of a voice output device; have each been discussed in connect with claims 33, 20, 67, and 73, respectively. Independent claim 161 is believed patentable.

Independent claim 162, as amended, is directed to a voice output system comprising: (a) a display area including a working region with a periphery; (b) a display device for displaying menu options on the display area, each menu option displayed adjacent the periphery of the working region, each menu option associated respectively with a position of a user activatable switch outside the display area, the switch being positionable with respect to the location of each menu option for selection thereof, each menu option associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words, for selection via the switch; and (c) a voice output device for speaking the particular sequence of one or more characters or words associated with a particular one of the menu options, in response a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the duration of a plurality of periods in which the position of the switch corresponds to the particular menu option.

Independent claim 162 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Golding, Lazzaro, and Anderson (Office Action, p.7, lines 12-13).

None of the applied art discloses or suggests either selecting a menu option or speaking in response to the position of a switch corresponding to a particular menu option during a *plurality* of periods. The patentable significance of menu options in a perimeter menu on the display area; of a multi-position switch; and of a voice output device; of have each been discussed in connect with claims 20, 67, and 73, respectively. Independent claim 162 is believed patentable.

Independent claim 163 is directed to a method of speaking for an individual having impaired motor capability and impaired speech. The method comprises the steps of:

simultaneously displaying selectable regions adjacent a working region on a display, one or more of the selectable regions associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words;

receiving a movement related signal indicating a location with respect to the display, the movement related signal responsive to user movement indicating a potential user selection;

speaking the sequence of one or more characters or words associated with a particular selectable regions responsive to a period of intersection of the particular selectable region and the location indicated by the movement related signal or the location on the display closest thereto, the period equalling or exceeding a predetermined period, whereby the user may make a selection although the user movement overshoots the particular selectable region on the display.

Independent claim 163 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Baker, Golding, and Lazzaro (Office Action, p.7, lines 4-5).

The patentable significance of displaying menu options in a perimeter menu on a display; speaking with a voice output device; speaking responsive to a period of intersection exceeding a predetermined period; and accommodating overshoot, have each been discussed in connect with claims 20, 73, 19, and 19 respectively. Independent claim 163 is believed patentable.

Independent claim 164 is directed to an apparatus for spelling and speaking a word, for use in a voice output system for a user having impaired motor capability. The apparatus comprises: (a) a voice output device; (b) a plurality of sequences of one or more letters, which, when appended in a particular order, spell a word; (c) a display on which may be displayed a plurality of selectable regions within a polygon on the display, each selectable region adjacent a side of the polygon, the plurality of selectable regions together at least partially circumscribing a region on the display, each of the selectable regions associated respectively with and displaying on the display one of the sequences of one or more letters; and (d) control means for: (1) receiving a movement related signal and moving a cursor within the polygon responsive to the movement related signal; (2) in response to a first selection event associated with an intersection of the cursor and one of the selectable

regions, first selecting the sequence associated with the intersected selectable region; (3) in response to a succession of selection events, each associated respectively with an intersection of the cursor and one of the selectable regions, successively appending the sequence of one or more letters associated with the intersected selectable region to the first selected sequence in the particular order; and (4) speaking, by means of the voice output device, the word.

Independent claim 164 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Baker, Golding, and Lazzaro (Office Action, p.7, lines 4-5).

The patentable significance of control means for appending successively selected letters; a voice output device for speaking the spelled word; selectable regions on a display; and means for accommodating overshoot, have each been discussed in connect with claims 73, 73, 20, and 19/22 respectively. Independent claim 164 is believed patentable.

Independent claim 165 is directed to an apparatus for voice output comprising: (a) a medium readable by a general purpose computer system including a voice output device and a display screen, the display screen including a working region with a periphery; and (b) a program, stored on the medium and executable by the general purpose computer system, for: (1) receiving a movement related signal indicating a location with respect to the display screen responsive to user movement by a user, the user movement indicating a potential user selection; (2) delimiting selectable regions adjacent the periphery of the working region, each of the selectable regions selectable by the user and having an external boundary wherein the external boundary includes the side of the selectable region furthest from the working region; (3) either preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or delimiting an activation area extending beyond the external boundary of the selectable region and beyond the display screen, each of the selectable regions associated respectively with and capable of simultaneously displaying a first sequence of one or more characters, a first sequence of one or more words, or a first sequence of one or more symbols representing the first sequence of one or more words; and (4) speaking with the voice output device the first sequence of one or more characters and/or words associated with a first particular selectable region responsive to a first intersection of the movement related signal and the first particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select the first particular selectable region while overshooting the first particular selectable region or by preventing the movement related signal from moving beyond the external boundary of the first particular selectable region.

Independent claim 165 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 -

p.8, line 2).

The patentable significance of a voice output device for speaking; a confiner; and means for accommodating overshoot, have each been discussed in connect with claims 73, 22, and 19 respectively. Ito does not disclose or suggest any of these features. Independent claim 165 is believed patentable.

Independent claim 166 is directed to an apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a medium readable by a general purpose computer system including a display screen, the display screen including a working region with a periphery; and (b) a program, stored on the medium and executable by the general purpose computer system, for: (1) at least partially delimiting a plurality of selectable regions, each of the selectable regions outside the display screen and each associated respectively with a displayed menu option; (2) receiving a movement related signal indicating successive locations with respect to the display screen; and (3) responsive to a first dwell event associated with a particular one of the selectable regions outside the display screen, the particular selectable region intersected by a plurality of the successive locations, selecting the menu option associated with the particular selectable region.

Independent claim 166 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

The patentable significance of selectable regions outside a display screen; and means responsive to a dwell event; have each been discussed in connect with claims 1 and 19 respectively. Ito does not disclose or suggest selection by dwell. Independent claim 166 is believed patentable.

Independent claim 170 is directed to an apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a display screen; (b) a delimit device for at least partially delimiting a plurality of selectable regions, each of the selectable regions outside the display screen and each associated respectively with a displayed menu option; (c) a movement related signal receiver for receiving a movement related signal indicating successive locations with respect to the display screen; and (d) a selection device, responsive to a first dwell event associated with a particular one of the selectable regions outside the display screen, the particular selectable region intersected by a plurality of the successive locations, for selecting the particular menu option associated with the particular selectable region.

Independent claim 170 stands rejected on the basis of Ito alone. (Office Action, p.7, line 18 - p.8, line 2).

The patentable significance of selectable regions outside a display screen; and means

responsive to a dwell event; have each been discussed in connect with claims 1 and 19 respectively. Ito does not disclose or suggest selection by dwell. Independent claim 170 is considered patentable.

Claim 171, depending from claim 170, adds any one of several enumerated pointers. Claim 171 is deemed patentable.

In claim 172, depending from claim 170, the first dwell event includes a plurality of periods of intersection, each of two or more of the successive locations and the particular selectable region. None of the applied references disclose or suggest selection responsive to a *plurality* of periods of intersection. Claim 172 is believed patentable independent of its parent claim.

In claim 173, depending from claim 170, the particular selectable region is not completely visible.

The apparatus of claim 173 claims the combination of (1) selectable regions outside the display screen, (2) a particular selectable region that is not completely visible, and (3) each selectable region associated respectively with a displayed menu option. While Baker discloses a selectable region that is not completely visible, it teaches against combining this with a plurality of *displayed* menu options, as was discussed in connection with claim 1. In addition, displaying the menu options is contrary to Baker's goal of maximizing the screen area available to the operator for document and data display in the windows both during functional operations (Baker, col. 2, lines 29-32). Claim 173 is believed patentable independent of its parent claim.

In claim 174, depending from claim 170 at most one of the selectable regions is adjacent the display screen. None of the applied art discloses or suggests this arrangement of selectable regions. Claim 174 is believed patentable independent of its parent claim.

In claim 175, depending from claim 170, each of the successive locations is relative to a predetermined location on the display screen or to a previous location of the successive locations. Claim 175 is considered patentable.

In claim 176, depending from claim 170, the first dwell event includes a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of two or more of the successive locations and the particular selectable region. Claim 176 is considered patentable.

In claim 177, depending from claim 170, the first dwell event includes a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of a ratio between: (1) the durations of one or more successive periods of intersection of two or more of the successive locations and the particular selectable region; and (2) the durations of one or more

successive periods of intersection of two or more of the successive locations and one of the selectable regions other than the particular selectable region. None of the applied art discloses or suggests selection responsive to a ratio of dwell times. Claim 177 is considered patentable independent of its parent claim.

Claim 178, depending from claim 170, adds a plurality of selectable regions on the display screen, each associated respectively with one of the selectable regions outside the display screen. The selection device is further operative, responsive to a second dwell event associated with a certain one of the selectable regions on the display screen, the certain selectable region associated with the particular selectable region, to select the particular menu option. The patentable significance of selectable regions both on and outside the display screen has been discussed in connection with claim 102. Claim 178 is considered patentable independent of its parent claim.

In claim 179, depending from claim 178, each of one or more of the selectable regions on the display screen is adjacent the associated selectable region outside the display screen. None of the applied art discloses or suggests such a structure, or accomodates overshoot as this structure does. Claim 179 is considered patentable independent of its parent claim.

In claim 180, depending from claim 178, each of one or more of the selectable regions on the display screen indicates the location of the associated selectable region outside the display screen. None of the applied art discloses or suggests the location of an on-screen selectable region indicating the location of an associated selectable regions outside the display screen. Claim 180 is considered patentable independent of its parent claim.

In claim 181, depending from claim 178, the plurality of selectable regions on the display screen together at least partially circumscribe a region on the display screen. The patentable significance of this structure has already been discussed in connection with claim 20. Claim 181 is considered patentable independent of its parent claim.

Claim 182, depending from claim 170, adds an indicator for indicating the remaining dwell time required to select the intersected selectable region. The patentable significance of an indicator for indicating remaining dwell time has already been discussed in connection with claim 104. Claim 182 is considered patentable independent of its parent claim.

In claim 183, depending from claim 170, the movement related signal is responsive to the movement of a body member of an operator having impaired ability to sense the position of the body member. The apparatus further comprises a tactile indicator for indicating tactilely to the operator the position of the body member. None of the applied art discloses or suggest a tactile indicator. Claim

183 is considered patentable independent of its parent claim.

Claim 184, depending from claim 170, adds an indicator for indicating on the display screen the location of one of the successive locations located outside the display screen. None of the applied art discloses or suggests such an on-screen indication. Claim 184 is considered patentable independent of its parent claim.

Claim 185, depending from claim 170, adds an indicator for indicating on the display screen the distance between one of the successive locations located outside the display screen and the point on the display screen closest thereto. None of the applied references disclose or suggest such an on-screen indication. Claim 185 is considered patentable independent of its parent claim.

Claim 185, depending from claim 170, adds an operator fatigue detector for detecting operator fatigue and wherein the first quantity is further a function of detected operator fatigue. None of the applied references disclose or suggest an operator fatigue detector. Claim 185 is considered patentable independent of its parent claim.

In claim 187, depending from claim 170, the first dwell event includes a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the duration of a period of intersection of two of the successive locations and the particular selectable region. The apparatus further includes an indicator for indicating the remaining dwell time required to select the particular menu option. The patentable significance of an indicator for indicating remaining dwell time has already been discussed in connection with claim 104. Claim 187 is considered patentable independent of its parent claim.

Claim 188, depending from claim 170, adds a certain selectable region on the display screen, the certain selectable region associated with the particular selectable region; and wherein the first quantity is further a function of the duration of a period of intersection of two of the successive locations and the certain selectable region. The patentable significance of a selectable region *on* the display screen has already been discussed in connection with claim 20 Claim 188 is considered patentable independent of its parent claim.

In claim 189, depending from claim 170, the particular menu option is associated with a submenu comprising a plurality of submenu options each associated respectively with one of the selectable regions. The selection device is further operative: (a) to display on the display screen the submenu options, responsive to the first dwell event; and (b) to select, responsive to a second dwell event, the submenu option associated with the selectable region associated with the second dwell event. The patentable significance of a menu hierarchy has already been discussed in connection with

claim 33. Claim 189 is considered patentable independent of its parent claim.

In claim 190, depending from claim 170, the particular selectable region is invisible. None of the applied art, including Baker, discloses or suggests an *invisible* selectable region *outside* the display. Claim 190 is considered patentable independent of its parent claim.

In claim 191, depending from claim 170, the particular menu option is associated with a submenu comprising a plurality of submenu options each associated respectively with one of the selectable regions. The selection device is further operative to select, responsive to a second dwell event, the submenu option associated with the selectable region associated with the second dwell event. The patentable significance of a menu hierarchy has already been discussed in connection with claim 33. Claim 191 is considered patentable independent of its parent claim.

In claim 192, depending from claim 170, the particular menu option represents a sequence of one or more words; and further comprising a voice output device for speaking the sequence of one or more words responsive to the selection device selecting the particular menu option. The patentable significance of a voice output device for speaking a sequence of one or more words has already been discussed in connection with claim 73 Claim 191 is considered patentable independent of its parent claim.

In claim 193, depending from claim 192, the particular selectable region is invisible. None of the applied art, including Baker, discloses or suggests the combination of an *invisible* selectable region *outside* the display and a voice output device. Claim 193 is considered patentable independent of its parent claim.

In claim 194, depending from claim 192, the selection device is responsive only to the first dwell event. Claim 194 is consider patentable.

Claim 195, depending from claim 170, adds a certain selectable region on the display screen, the certain selectable region associated with the particular selectable region. The first dwell event includes a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of: (a) the durations of one or more successive periods of intersection of two or more of the successive locations and the certain selectable region; and (b) the durations of one or more successive periods of intersection of two or more of the successive locations and the particular selectable region.

None of the applied art discloses or suggests a dwell event that is a function of both dwell on a selectable region *on* the display screen and an associated selectable region *outside* the display. Claim 195 is considered patentable independent of its parent claim.

Claim 196, depending from claim 170, adds a signal generating device, coupled to a device, for generating a device control signal corresponding to a device control function for controlling the device. The particular menu option represents the device control function. The signal generating device, in response to the first dwell event, generates the device control signal. Claim 196 is considered patentable independent of its parent claim.

Claim 197, depending from claim 196, limits the controlled device to any one of several enumerated devices. Claim 196 is deemed patentable.

Independent claim 198 is directed to an apparatus for speaking a sequence of one or more words. The apparatus comprises: (a) a voice output device; (b) a plurality of sequences of one or more words, or a plurality of sequences of one or more symbols each sequence of one or more symbols representing one of the sequences of one or more words; (c) a display screen including a working region with a periphery, the display screen capable of displaying a plurality of selectable regions adjacent the periphery of the working region, each of the selectable regions selectable by the user, each of the selectable regions associated respectively with and simultaneously displaying on the display screen one of the sequences of one or more words or symbols; and (d) control means for: (1) receiving a movement related signal indicating a location with respect to the display screen responsive to user movement by a user, the user movement indicating a potential user selection; (2) in response to an intersection of the location and a particular one of the selectable regions, speaking, by means of the voice output device, the sequence of one or more words associated with the particular selectable region.

Independent claim 198 stands rejected under 35 U.S.C. §103 based upon the combination of Ito, Baker, and Golding (Office Action, p.7, lines 6-7).

The patentable significance of a voice output device for speaking a sequence of one or more words; selectable regions on a display screen; and the perimeter menu structure; have already been discussed in connect with claims 73, 20, and 20 respectively. Baker is discussed in connection with claim 1. Independent claim 198 is considered patentable.

In the Office Action, the Examiner makes certain of assumptions concerning the prior art and the level of ordinary skill in the art and then makes a series of modifications to Ito, sometimes drawing on applied art, sometimes on her own personal knowledge. These assumptions and modifications are:

1. assume that Ito, Baker, Choi, Golding, Lazzaro, Atkinson, and Anderson are each prior art within the meaning of 35 U.S.C. §103;

2. disintegrate the integrated input/display device of Ito;
3. delete Ito's stylus pen;
4. add a pointer;
5. delete from Ito's functionality selection *outside* of the coordinate detection range of the input device;
6. delete selection by click;
7. add selection by dwell;
8. replace Ito's narrow strip of selectable regions with large, potentially unbounded, selectable regions;
9. move Ito's selection regions from outside the screen to on the screen;
10. move Ito's labels from outside the screen to on the screen;
11. make Ito's labels dynamic;
12. replace Ito's commands with ideographs;
13. add a voice output device.

This a long chain of modifications, each one of which must be obvious within the meaning of 35 U.S.C. §103 to make all the claimed combinations obvious. A failure of any link in this chain is fatal to the *prima facie* case of obviousness. Furthermore, since 35 U.S.C. §103 requires that a patent be granted unless the invention "as a whole" would have been obvious, the *entire* chain of modifications, from starting point to ending point, required to produce a claimed apparatus or method must be obvious. In addition, the motivation to make each of the modifications or combinations must be found in the applied art. *In re* Lalu, 747 F.2d 703, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984).

Applicant requests a telephone interview with the Examiner. Discussion will expedite resolution of the issues in this case and reduce the amount of the Examiner's time required for prosecution.

In view of the foregoing, and in summary, claims 1, 19-58, 61-80, 82-89, 94, 101-106, 108, and 112-205 pending in the present application are considered patentable over the cited references. Favorable reconsideration of the Application, as amended, is respectfully requested.

Respectfully submitted,

Donald K. Forest

Donald K. Forest

Applicant

Date: 28 September 1998

209 Croydon Ave.
Rockville, MD 20850-4145
Phone (301) 251-1108
Fax (301) 251-6299

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I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, DC 20231, on 28 September 1998.

Donald K. Forest

Donald K. Forest

28 September 1998

Date of Signing